

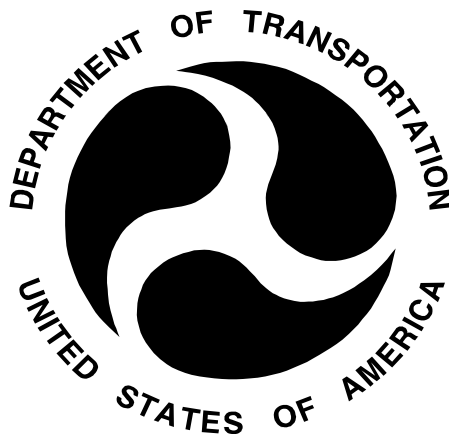
126-TRC-09-002

**SAFETY COMPLIANCE TESTING FOR FMVSS 126
Electronic Stability Control Systems**

General Motors Corporation
2009 Chevrolet Cobalt SS
NHTSA No. C90103

TRANSPORTATION RESEARCH CENTER INC.

10820 State Route 347
East Liberty, Ohio 43319



March 16, 2009

FINAL REPORT


Prepared Under Contract No.: DTNH22-08-P-0097

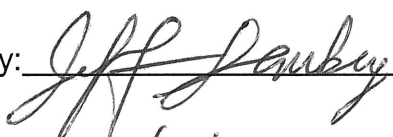
**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement**

**Office of Vehicle Safety Compliance
1200 New Jersey Avenue, SE
West Building, 4th Floor (NVS-221)
Washington, DC 20590**

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16. Abstract A test was conducted on a 2009 Chevrolet Cobalt SS, NHTSA No. C90103, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-126-02 for the determination of FMVSS 126 compliance. Test failures identified were as follows: None			
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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this test is to determine if the test vehicle, an MY 2009 Chevrolet Cobalt SS meets the minimum equipment and performance requirements stated in Federal Motor Vehicle Safety Standard (FMVSS) 126, "Electronic Stability Control Systems."

This standard establishes performance and equipment requirements for Electronic Stability Control (ESC) Systems installed in passenger cars, multipurpose passenger vehicles, trucks and buses with a gross vehicle weight rating of 4,536 kilograms or less.

2.0 TEST PROCEDURE AND DISCUSSION OF RESULTS

Testing of the MY 2009 Chevrolet Cobalt SS was conducted at Transportation Research Center Inc. (TRC Inc.) in accordance with NHTSA TP-126-02, dated November 19, 2008.

The vehicle was inspected to ensure it was equipped with an ESC System that:

- Augments vehicle directional stability by applying and adjusting brake torques individually at each wheel to induce a correcting yaw moment to a vehicle;
- Is computer controlled with the computer using a closed-loop algorithm to limit vehicle oversteer and to limit vehicle understeer;
- Has a means to determine the vehicle's yaw rate and to estimate its side slip or side slip derivative with respect to time;
- Has a means to monitor driver steering inputs;
- Has an algorithm to determine the need, and a means to modify engine torque, as necessary, to assist the driver in maintaining control of the vehicle, and
- Is operational over the full speed range of the vehicle (except at vehicle speeds less than 15km/h (9.3mph) or when being driven in reverse).

The vehicle was subjected to a 0.7Hz sine with dwell (SWD) steering maneuver to ensure that it would meet the stability and responsiveness requirements of the standard as follows:

- At 1.0 second after completion of a required sine with dwell steering input, the yaw rate of the vehicle must not exceed 35 percent of the first peak value of yaw rate recorded after the steering wheel angle changes sign (between first and second peaks during the same test run).
- At 1.75 seconds after completion of a required sine with dwell steering input, the yaw rate of the vehicle must not exceed 20 percent of the first peak value of yaw rate recorded after the steering wheel angle changes sign (between first and second peaks during the same test run).
- The lateral displacement of the vehicle center of gravity with respect to its initial straight path must be at least 1.83 m (6 feet) (for vehicles with a GVWR of 3,500kg (7,716 lb) or less) when computed 1.07 seconds after the Beginning of Steer (BOS) at the specified steering wheel angles.

System malfunction simulations were executed to verify vehicle could identify and indicate a malfunction.

The vehicle's ESC System appears to meet the performance and equipment requirements as required by FMVSS 126. The test results are summarized on the following summary sheet.

2.0 TEST PROCEDURE AND DISCUSSION OF RESULTS ...continued

DATA SUMMARY (Sheet 1 of 2)

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet / Cobalt SS / Passenger car

VEHICLE NHTSA NO.: C90103 VIN: 1G1AP18X197162661

VEHICLE TYPE: Passenger car DATE OF MANUFACTURE: 09/08

LABORATORY: Transportation Research Center Inc.

REQUIREMENTS

PASS/FAIL

ESC Equipment and Operational Characteristics (Data Sheet 2)

The vehicle is to be equipped with an ESC system that meets the equipment PASS
and operational characteristics requirements. (S126, S5.1, S5.6)

ESC Malfunction Telltale (Data Sheet 3)

The vehicle is equipped with a telltale that indicates one or more SEE REMARKS
ESC system malfunctions. (S126, S5.3)

“ESC Off” and other System Controls and Telltale (Data Sheet 3 & 4)

The vehicle is equipped with an ESC off telltale indicating the vehicle SEE REMARKS
has been put into a mode that renders the ESC system unable to
satisfy the performance requirements of the standard, if such a mode
exists. (S5.5.1)

REMARKS:

A Competition Mode is a selectable mode by the driver. During the Competition Mode, ESC is still active but the Traction Control System (TCS) is off (per owners manual).

2.0 TEST PROCEDURE AND DISCUSSION OF RESULTS ...continued

DATA SUMMARY (Sheet 2 of 2)

REQUIREMENTS	PASS/FAIL
If provided, off control and other system controls as well as the ESC off telltale meets the operational requirements (S126, S5.4, S5.4.1, S5.4.2, S5.5.4, and S5.5.9)	<u>PASS</u>
Vehicle Lateral Stability (Data Sheet 8)	
Yaw Rate Ratio at 1 second after COS is less than 35% of peak value. (S126, S5.2.1)	<u>PASS</u>
Yaw Rate Ratio at 1.75 seconds after COS is less than 20% of peak value. (S126, S5.2.2)	<u>PASS</u>
Vehicle Responsiveness (Data Sheet 8)	
Lateral displacement at 1.07 seconds after BOS is at least 1.83 m (6 feet) for vehicles with a GVWR of 3,500kg (7,716 lbs.) or less, and 1.52 m (5 feet) for vehicles with a GVWR greater than 3,500 kg (7,716 lbs.). (S126 S5.2.3)	<u>PASS</u>
ESC Malfunction Warning (Data Sheet 9)	
Warning is provided to driver after malfunction occurrence. (S126. S5.3)	<u>PASS</u>
Malfunction telltale stayed illuminated as long as malfunction existed and must extinguished after malfunction was corrected. (S126, S5.3.7)	<u>PASS</u>

3.0 TEST DATA

DATA SHEET 1 (Sheet 1 of 2)
TEST VEHICLE INSPECTION AND TEST PREPARATION

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet / Cobalt SS / Passenger car

NHTSA No.: C90103 TEST DATE: 10-24-08

VIN: 1G1AP18X197162661 MANUFACTURE DATE: 09/08

GVWR: 1,775 KG FRONT GAWR: 923 KG REAR GAWR 852 KG

SEATING POSITIONS: FRONT 2 REAR 3

ODOMETER READING AT START OF TEST: 91 (146.5) Miles (Kilometers)

DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING:

Front Axle P225 / 40ZR 18 Y Rear Axle P225 / 40ZR 18 Y

INSTALLED TIRE SIZE(S) ON VEHICLE:

<u>From Tire Sidewall</u>	<u>Front Axle</u>	<u>Rear Axle</u>
Manufacturer and Model	<u>Continental Sport Contact2</u>	<u>Continental Sport Contact2</u>
Tire Size Designation	P225 / 40ZR 18 92Y	P225 / 40ZR 18 92Y

Are installed tire sizes same as labeled tire sizes? X Yes No
If no, contact COTR for further guidance.

DRIVE CONFIGURATIONS (MARK ALL THAT APPLY):

☒ Two Wheel Drive (2WD): (☒) Front Wheel Drive (☐) Rear Wheel Drive
☐ All Wheel Drive (AWD)
☐ Four Wheel Drive Automatic – differential not locked full time (4WD Automatic)
☐ Four Wheel Drive High Gear Locked Differential (4WD HGLD)
☐ Four Wheel Drive Low Gear (4WD Low)
☐ Other (define _____)

3.0 TEST DATA....continued

DATA SHEET 1 (Sheet 2 of 2) TEST VEHICLE INSPECTION AND TEST PREPARATION

DRIVE CONFIGURATIONS AND MODES: (ex. default, performance, off)

(For each of the vehicle's drive configurations identify available operating modes)

Drive Configuration 2WD – front wheel drive
Mode(s) default

Drive Configuration 2WD – front wheel drive
Mode(s) Competition Mode (selectable) – ESC On & TCS Off

Drive Configuration 2WD – front wheel drive
Mode(s) ESC Off & TCS Off (selectable)

VEHICLE STABILITY SYSTEMS (Check applicable technologies):

 X ESC X Traction Control Roll Stability Control

 Active Suspension X Electronic Throttle Control Active Steering

 X ABS

List other systems; _____

REMARKS:

A Competition Mode is a selectable mode by the driver. During the Competition Mode, ESC is still active but the Traction Control System (TCS) is off (per owners manual).

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 10-24-08
DATE: 3-17-09

3.0 TEST DATA....continued

DATA SHEET 2 (Sheet 1 of 2) ESC SYSTEM HARDWARE AND OPERATIONAL CHARACTERISTICS

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet / Cobalt SS / Passenger car

NHTSA No.: C90103

TEST DATE: 10-24-08

ESC SYSTEM IDENTIFICATION:

Manufacturer/Model Continental Automotive Systems/Model #: CT Mk25e

ESC SYSTEM HARDWARE (Check applicable hardware):

<input checked="" type="checkbox"/> Electronic Control Unit	<input checked="" type="checkbox"/> Hydraulic Control Unit
<input checked="" type="checkbox"/> Wheel Speed Sensors	<input checked="" type="checkbox"/> Steering Angle Sensor
<input checked="" type="checkbox"/> Yaw Rate Sensor	<input checked="" type="checkbox"/> Lateral Acceleration Sensor

List other components; Brake vacuum booster (brake actuation)

ESC SYSTEM OPERATIONAL CHARACTERISTICS:

System is capable of generating brake torques at each wheel ☒ Yes (PASS)
☐ No (FAIL)

List and describe component(s): Hydraulic brake system

System is capable of determining yaw rate ☒ Yes (PASS)
☐ No (FAIL)

List and describe component(s): Yaw Rate Sensor

System is capable of monitoring driver steering input ☒ Yes (PASS)
☐ No (FAIL)

List and describe component(s): Steering Wheel Angle Sensor

System is capable of estimating side slip or side slip derivation ☒ Yes (PASS)
☐ No (FAIL)

List and describe component(s): Four Independent Wheel Speed Sensors
Steering Wheel Angle Sensor
Yaw Rate Sensor
Lateral Acceleration Sensor

3.0 TEST DATA....continued

DATA SHEET 2 (Sheet 2 of 2) ESC SYSTEM HARDWARE AND OPERATIONAL CHARACTERISTICS

ESC SYSTEM OPERATIONAL CHARACTERISTICS (continued):

System is capable of modifying engine torque during ESC activation. X Yes (PASS)
 No (FAIL)

Method used to modify engine torque: Electronic Stability Control Unit sends signals to the Engine Control Module, requesting a specific percentage engine torque reduction. The Engine Control Module delivers the requested engine torque reduction using its own control algorithm.

System is capable of activation at speeds of 20 km/h (12.4 mph) and higher. X Yes (PASS)
 No (FAIL)

Speed system becomes active. 10.8 km/h

System is capable of activation during the following driving phases (acceleration, deceleration, coasting, and during activation of ABS or traction control). X Yes (PASS)
 No (FAIL)

Driving phases that the system is capable of activation. Forward direction accelerating, braking, coasting, ABS activation, TCS activation in the forward direction only.

Vehicle manufacturer submitted documentation explaining how the ESC system mitigates understeer? X Yes (PASS)
 No (FAIL)

DATA INDICATES COMPLIANCE PASS/FAIL PASS

REMARKS:

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 10-24-08
DATE: 3-17-09

3.0 TEST DATA....continued

DATA SHEET 3 (Sheet 1 of 5) ESC MALFUNCTION AND OFF TELLTALES

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet / Cobalt SS / Passenger car

VEHICLE NHTSA NO. C90103 TEST DATE: 12-04-08

ESC Malfunction Telltale

Vehicle is equipped with malfunction telltale? X Yes (Pass) No (Fail)

Telltale Location Instrument cluster – between speedometer and tachometer. Driver Information Center (DIC) displays message: “Service ESC”

Telltale Color yellow

Telltale symbol or abbreviation used.



Or

ESC

 Vehicle uses this symbol

 Vehicles uses this abbreviation

 X Neither symbol or abbreviation is used

If different than identified above, make note of any message, symbol or abbreviation used.

Uses the above symbol surrounded by a triangle.

Is telltale part of a common space? X Yes No

Is telltale also used to indicate activation of the ESC system? X Yes No

If yes, explain telltale operation during ESC activation: warning light flashes

23. DATA SHEETS....continued

DATA SHEET 3 (Sheet 2 of 2)
ESC MALFUNCTION AND OFF TELLTALES

“ESC OFF” Telltale (if provided)

Vehicle is equipped with "ESC Off" telltale? X Yes No

Is "ESC OFF" telltale combined with "ESC Malfunction" telltale utilizing a two part telltale
 X Yes No

Telltale Location Instrument cluster – between speedometer and tachometer

Telltale Color yellow

Telltale symbol or abbreviation used.



Or

ESC OFF

_____ Vehicle uses this symbol

Vehicle uses this abbreviation

 X Neither symbol or abbreviation is used

If different than identified above, make note of any message, symbol or abbreviation used.

Uses the above symbol surrounded by a triangle. Illuminates steady. Does not indicate the word "Off."

Is telltale part of a common space? X Yes No

DATA INDICATES COMPLIANCE PASS/FAIL PASS
(Vehicle is compliant if equipped with a malfunction telltale)

REMARKS:

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 12/04/09
DATE: 3/17/09

3.0 TEST DATA....continued

DATA SHEET 4 (Sheet 1 of 3) ESC AND ANCILLARY SYSTEM CONTROLS

“ESC OFF” Controls Identification and Operational Check:

Is the vehicle equipped with a control or controls whose purpose is to deactivate the ESC system or place the ESC system in a mode or modes that may no longer satisfy the performance requirements of the standard?

 X Yes No

Type of control or controls provided?
(mark all that apply)

 Dedicated “ESC Off” control
 X Multi-functional control with an
“ESC Off” mode
 Other (describe)

Identify each control location, labeling and selectable modes.

First Control: Location Right side on dash panel, next to steering column
 Labeling Symbol: car skidding
 Modes ESC Off / TCS Off / Competitive Driving Mode / Launch
 Control

Second Control: Location N/A
 Labeling N/A
 Modes N/A

Identify standard or default drive configuration 2WD – front wheel drive

Verify standard or default drive configuration selected. X Yes No

Does the “ESC Off” telltale illuminate upon activation of the dedicated ESC off control or selection of the “ESC Off” mode on the multi-function control?

 X Yes No (fail)

Does the “ESC Off” telltale extinguish when the ignition is cycled from “On” (“Run”) to “Lock” or “Off” and then back again to the “On” (“Run”) position?

 X Yes No (fail)

If no, describe how the off control functions:

3.0 TEST DATA....continued

DATA SHEET 4 (Sheet 2 of 3) ESC AND ANCILLARY SYSTEM CONTROLS

If a multi-function control is provided, cycle through each mode setting on the control and record which modes illuminate the “ESC Off” telltale. Also, for those modes that illuminate the ESC Off” telltale identify if the telltale extinguishes upon cycling the ignition system.

Control Modes	“ESC Off” telltale illuminates upon activation of control? (Yes / No)	“ESC Off” telltale extinguishes upon cycling ignition? (Yes / No)
ESC Off & TCS Off	Yes	Yes
TCS Off / Competitive Driving Mode	Yes	Yes

For each mode that illuminates the “ESC Off” telltale, did the telltale extinguish when the ignition was cycled from “On” (“Run”) to “Lock” or “Off” and then back again to the “On” (“Run”) position?

 X Yes No (fail)

Other System Controls that have an ancillary effect on ESC Operation:

Is the vehicle equipped with any ancillary controls that upon activation may deactivate the ESC system or place the ESC system in a mode or modes that may no longer satisfy the performance requirements of the standard?

 Yes X No

List and describe each control (i.e. alternate drive configuration selection controls):

Ancillary Control: System N/A
 Control Description N/A
 Labeling N/A

Ancillary Control: System N/A
 Control Description N/A
 Labeling N/A

3.0 TEST DATA....continued

DATA SHEET 4 (Sheet 3 of 3) ESC AND ANCILLARY SYSTEM CONTROLS

Activate each control listed above and record whether the control illuminates the "ESC Off" telltale. Also, record warnings or messages provided regarding the ESC system.

Ancillary Control	Control Activates "ESC Off" Telltale? (Yes/No)	Warnings or Messages Provided
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

For those controls that illuminate the "ESC Off" telltale above identify if the "ESC Off" telltale extinguishes upon cycling the ignition system.

Ancillary Control	"ESC Off" telltale extinguishes upon cycling ignition? (Yes/No)
N/A	N/A
N/A	N/A
N/A	N/A

For each control that illuminates the "ESC Off" telltale, did the telltale extinguish when the ignition is cycled from "On" ("Run") to "Lock" or "Off" and then back again to the "On" ("Run") position? If the control activated places the vehicle into a low-range four-wheel drive configuration designed for low-speed, off-road driving, the ESC system may remain turned off after the ignition has been cycled off and then back on and therefore the "ESC Off" telltale may not extinguish.

_____ Yes _____ No (fail)

DATA INDICATES COMPLIANCE:

PASS/FAIL PASS

REMARKS:

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 12/05/08
DATE: 3/17/09

DATA SHEET 5 (Sheet 1 of 3)
VEHICLE AND TEST TRACK DATA

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet / Cobalt SS / Passenger car

NHTSA No.: C90103 TEST DATE: 3-06-09

Test Track Requirements: Test Surface Slope (0-1 %) 1 %

Peak Friction Coefficient (at least 0.9) 0.9

Full Fluid Levels: Fuel X Coolant X Other Fluids Washer (specify)

Tire Pressures: Required: Front Axle 230.0 KPa Rear Axle 230.0 KPa
Actual: LF 230.0 KPa RF 230.0 KPa LR 230.0 KPA RR 230.0 KPa

Vehicle Dimensions: Track Width 148.9 cm Wheelbase 263.5 cm

Roof Height 139.5 cm

Vehicle weight ratings: GAWR Front 923 KG GAWR Rear 852 KG

Unloaded Vehicle Weight (UVW)

Front Axle 814.5 KG Left Front 406.9 KG Right Front 407.6 KG

Rear Axle 536.1 KG Left Rear 275.3 KG Right Rear 260.8 KG

Total UVW 1,350.6 KG

Baseline Weight and Outrigger Selection (only for MPVs, Trucks, Buses)

Calculated Baseline Weight (UVW+ 73 kg) N/A KG

Outrigger size required ("Standard" or "Heavy") N/A

Standard - Baseline weight under 2,722 kg (6,000 lbs)

Heavy - Baseline weight equal to or greater than 2,722 kg (6,000 lbs)

3.0 TEST DATA....continued

DATA SHEET 5 (Sheet 2 of 3) VEHICLE AND TEST TRACK DATA

UVW with Outriggers (only for MPVs, Trucks, Buses)

Front Axle N/A KG Left Front N/A KG Right Front N/A KG
Rear Axle N/A KG Left Rear N/A KG Right Rear N/A KG
Total UVW w/ Outriggers N/A KG

Loaded Vehicle Weight w/ Driver and Instrumentation (No Ballast)

Front Axle 884.5 KG Left Front 444.7 KG Right Front 439.8 KG
Rear Axle 594.0 KG Left Rear 314.6 KG Left Rear 279.4 KG
Total Loaded weight w/ Driver 1,478.5 KG

Ballast Required = [**UVW** + 168 KG] - **Total Loaded Weight w/ Driver and Instrumentation**

 = [1,350.6 KG + 168 KG] - 1,478.5 KG

 = 40.1 KG

Total Loaded Vehicle Weight

Front Axle 899.2 KG Left Front 448.1 KG Right Front 451.1 KG
Rear Axle 619.2 KG Left Rear 321.6 KG Right Rear 297.6 KG
Total Loaded Vehicle Weight 1,518.4 KG

3.0 TEST DATA....continued

DATA SHEET 5 (Sheet 3 of 3) VEHICLE AND TEST TRACK DATA

Center of Gravity and Inertial Sensing System Location at Loaded Vehicle Condition

x-distance (longitudinal) Point of reference is the front axle centerline.
(Positive from front axle toward rear of vehicle.)

y-distance (lateral) Point of reference is the vehicle centerline.
(Positive from the center toward the right.)

z-distance (vertical) Point of reference is the ground plane.
(Positive from the ground up.)

Locations:

	Center of Gravity	Inertial Sensing System
x-distance	<u>107.5</u> cm	<u>154.3</u> cm
y-distance	<u>-1.03</u> cm	<u>-0.20</u> cm
z-distance	<u>53.0</u> cm	<u>51.7</u> cm

Distance Between Ultrasonic Sensors: 174.6 cm

Roof Height: 139.5 cm

TEST TRACK DATA MEETS REQUIREMENTS: YES/NO YES
If no, explain: _____

REMARKS:

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 3-03-09
DATE: 3-17-09

3.0 TEST DATA....continued

DATA SHEET 6 (Sheet 1 of 3) BRAKE AND TIRE CONDITIONING

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet/Cobalt SS/Passenger Car

VEHICLE NHTSA No.: C90103

Measured Cold Tire Pressures: LF 230 KPA RF 230 KPA

LR 230 KPA RR 230 KPA

Wind Speed 4.9 m/sec
(10m/sec (22mph) max for passenger cars; 5m/s (11mph) max. for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 9.4 °C

Brake Conditioning Time; 11:03 AM Date; 3-05-09

56 km/h (35 mph) Brake Stops

Number of stops executed (10 required) 11 stops

Observed deceleration rate range (.5g target) 0.49 – 0.53 g

72 km/h (45 mph) Brake Stops

Number of stops executed (3 required) 3 stops

Number of stops ABS activated (3 required) 3 stops

Observed deceleration rate range 1.1 – 1.15 g

72 km/h (45 mph) Brake Cool Down Period

Duration of cool down period (5 minutes min.) 5.5 minutes

3.0 TEST DATA....continued

DATA SHEET 6 (Sheet 2 of 3) BRAKE AND TIRE CONDITIONING

Tire Conditioning Series No. 1 Time: 11:26 AM Date: 3-05-09

Measured Tire Pressures: LF 234 KPA RF 234 KPA

LR 234 KPA RR 234 KPA

Wind Speed 4.9 m/sec
(10m/sec (22mph) max for passenger cars; 5m/s (11mph) max. for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 10.6 °C

30 meter (100 ft) Diameter Circle Maneuver				
Test Runs	Steering Direction	Target Lateral Acceleration (g)	Observed Lateral Acceleration (g)	Observed Vehicle Speed (km/h)
1-3	Clockwise	0.5-0.6	0.55	45.9
4-6	Counterclockwise	0.5-0.6	0.55	45.9

1 Hz 3 Cycle Sinusoidal Steering Maneuver to Determine Steering Wheel Angle For 0.5-0.6g Lateral Acceleration				
Test Runs	Vehicle Speed Km/h(mph)	Steering Wheel Angle (degrees)	Target Peak Lateral Acceleration (g)	Observed Peak Lateral Acceleration (g)
1	56±2 (35±1)	30	0.5-0.6	0.30
2	56±2 (35±1)	60	0.5-0.6	0.53
3	56±2 (35±1)		0.5-0.6	
4	56±2 (35±1)		0.5-0.6	

Steering wheel angle that corresponds to a peak 0.5–0.6g lateral acceleration; 60 degrees

1 Hz 10 Cycle Sinusoidal Steering Maneuver				
Test Runs	Vehicle Speed Km/h (mph)	Steering Wheel Angle (degrees)	Target Peak Lateral Acceleration (g)	Observed Peak Lateral Acceleration (g)
1 - 3	56±2 (35±1)	60 (cycles 1-10)	0.5-0.6	0.55
4	56±2 (35±1)	60 (cycles 1-9)	0.5-0.6	0.55
		120 (cycle 10)*	N/A	0.95

* The steering wheel angle used for cycle 10 should be twice the angle used for cycles 1-9.

3.0 TEST DATA....continued

DATA SHEET 6 (Sheet 3 of 3) BRAKE AND TIRE CONDITIONING

Tire Conditioning Series No. 2 Time: 1:32 PM Date: 3-05-09

Measured Tire Pressures: LF 238 KPA RF 238 KPA
LR 234 KPA RR 234 KPA

Wind Speed 5.8 m/sec
(10m/sec (22mph) max for passenger cars; 5m/s (11mph) max. for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 11.7 °C

30 meter (100 ft) Diameter Circle Maneuver				
Test Runs	Steering Direction	Target Lateral Acceleration (g)	Observed Lateral Acceleration (g)	Observed Vehicle Speed (km/h)
1-3	clockwise	0.5-0.6	0.55	45.9
4-6	counterclockwise	0.5-0.6	0.55	45.9

1 Hz 3 Cycle Sinusoidal Steering Maneuver to Determine Steering Wheel Angle For 0.5-0.6g Lateral Acceleration				
Test Runs	Vehicle Speed Km/h (mph)	Steering Wheel Angle (degrees)	Target Peak Lateral Acceleration (g)	Observed Peak Lateral Acceleration (g)
1	56+2 (35+1)	30	0.5-0.6	N/A
2	56+2 (35+1)		0.5-0.6	
3	56+2 (35+1)		0.5-0.6	
4	56+2 (35+1)		0.5-0.6	

Steering wheel angle that corresponds to a peak 0.5–0.6g lateral acceleration; 60 degrees

1 Hz 10 Cycle Sinusoidal Steering Maneuver				
Test Runs	Vehicle Speed (mph)	Steering Wheel Angle (degrees)	Target Peak Lateral Acceleration (g)	Observed Peak Lateral Acceleration (g)
1 - 3	56+2 (35+1)	60 (cycles 1-10)	0.5-0.6	0.55
4	56+2 (35+1)	60 (cycles 1-9)	0.5-0.6	0.55
		120 (cycle 10)*	N/A	0.95

* The steering wheel angle used for cycle 10 should be twice the angle used for cycles 1-9.

REMARKS:

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 3-05-09
DATE: 3-17-09

3.0 TEST DATA....continued

DATA SHEET 7 (1 of 2) SLOWLY INCREASING STEER (SIS) MANEUVER

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet/Cobalt SS/Passenger Car

VEHICLE NHTSA No.: C90103 TEST DATE: 2-13-09

Wind Speed 4.9 m/sec
(10m/sec (22mph) max for passenger cars; 5m/s (11mph) max. for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 12.2 °C

Static Data File Number: 0008
Selected Drive Configuration: default - FWD
Selected Mode: default

Preliminary Left Steer Maneuver:

Lateral Acceleration measured at 30 degrees steering wheel angle ($a_{y,30 \text{ degrees}}$)
 $a_{y,30 \text{ degrees}} = \underline{0.40} \text{ g}$

Assuming a linear relationship the following ratio should be used to calculate the steering wheel angle at .55g.

$$\frac{30 \text{ degrees}}{a_{y,30 \text{ degrees}}} = \frac{\delta_{SIS}}{0.55 \text{ g}}$$

$$\delta_{SIS} = \underline{41.25} \text{ degrees @ } 0.55 \text{ g}$$

$$\delta_{SIS} = \underline{40.0} \text{ degrees (rounded)}$$

Steering Wheel Angle at Corrected 0.3 g Lateral Acceleration:

Maneuver #	Initial Steer Direction	Time Clock (5 min max between runs)	Steering Wheel Angle to nearest 0.1 degree (degrees)	All Conditions Met?
1	Left	12:00 pm	-25.7	Yes
2	Left	12:03 pm	-26.5	Yes
3	Left	12:06 pm	-26.3	Yes
4	Right	12:12 pm	24.9	Yes
5	Right	12:22 pm	25.3	Yes
6	Right	12:24 pm	25.2	Yes

3.0 TEST DATA....continued

DATA SHEET 7 (2 of 2) SLOWLY INCREASING STEER (SIS) MANEUVER

Average Overall Steering Wheel Angle:

$$\delta_{0.3 \text{ g, overall}} = (|\delta_{0.3 \text{ g, left (1)}}| + |\delta_{0.3 \text{ g, left (2)}}| + |\delta_{0.3 \text{ g, left (3)}}| + \delta_{0.3 \text{ g, right (1)}} + \delta_{0.3 \text{ g, right (2)}} + \delta_{0.3 \text{ g, right (3)}}) / 6$$

$$\delta_{0.3 \text{ g, overall}} = \underline{\quad 25.6 \quad} \text{ degrees} \\ \text{[to nearest 0.1 degree]}$$

REMARKS:

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 3-05-09
DATE: 3-17-09

3.0 TEST DATA....continued

DATA SHEET 8 (1 of 3) VEHICLE LATERAL STABILITY AND RESPONSIVENESS

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet/Cobalt SS/Passenger Car

VEHICLE NHTSA No.: C90103 TEST DATE: 3-05-09

Tire conditioning completed	<u>X</u>	Yes	<u> </u>	No
ESC system is enabled	<u>X</u>	Yes	<u> </u>	No
On track calibration checks have been completed	<u>X</u>	Yes	<u> </u>	No
On track static data file for each sensor obtained	<u>X</u>	Yes	<u> </u>	No

Selected Drive Configuration: default - FWD
Selected Mode: default

Overall steering wheel angle ($\delta_{0.3g, \text{ overall}}$) 25.6 degrees
Static Data File Number 0020

Lateral Stability Test Series No. 1 – Counterclockwise Initial Steer Direction

Maneuver #	Clock Time (1.5 – 5 min between each test run)	Commanded Steering Wheel Angle ¹ (degrees)		Yaw Rates (degrees/sec)			YRR at 1.0 sec after COS [≤ 35%]		YRR at 1.75 sec after COS [≤ 20%]	
		Scalar	Angle	$\dot{\psi}_{Peak}$	$\dot{\psi}_{1.0sec}$	$\dot{\psi}_{1.75sec}$	%	Pass/Fail	%	Pass/Fail
1	1:50 pm	1.5* $\delta_{0.3g}$	38	12.25	0.04	0.09	0.30	Pass	0.72	Pass
2	1:52 pm	2.0* $\delta_{0.3g}$	51	17.01	-0.06	-0.01	-0.37	Pass	-0.03	Pass
3	1:55 pm	2.5* $\delta_{0.3g}$	64	20.95	-0.11	-0.11	-0.53	Pass	-0.51	Pass
4	1:59 pm	3.0* $\delta_{0.3g}$	77	25.32	0.13	0.01	0.53	Pass	0.06	Pass
5	2:02 pm	3.5* $\delta_{0.3g}$	90	29.39	0.28	0.04	0.96	Pass	0.15	Pass
6	2:06 pm	4.0* $\delta_{0.3g}$	102	29.89	-0.02	-0.12	-0.06	Pass	-0.40	Pass
7	2:09 pm	4.5* $\delta_{0.3g}$	115	35.45	-0.06	-0.15	-0.17	Pass	-0.42	Pass
8	2:12 pm	5.0* $\delta_{0.3g}$	128	39.65	-0.21	-0.10	-0.54	Pass	-0.26	Pass
9	2:15 pm	5.5* $\delta_{0.3g}$	141	40.63	-0.31	-0.13	-0.76	Pass	-0.33	Pass
10	2:19 pm	6.0* $\delta_{0.3g}$	154	45.49	-0.19	-0.06	-0.43	Pass	-0.12	Pass
11	2:24 pm	6.5* $\delta_{0.3g}$	166	48.03	0.49	-0.18	-1.01	Pass	-0.38	Pass
12	2:27 pm	7.0* $\delta_{0.3g}$	179	50.80	1.48	-0.10	2.91	Pass	-0.20	Pass
13	2:31 pm	7.5* $\delta_{0.3g}$	192	52.51	1.12	-0.24	2.13	Pass	-0.45	Pass
14	2:34 pm	8.0* $\delta_{0.3g}$	205	54.34	1.36	-0.06	2.49	Pass	-0.11	Pass
15	2:37 pm	8.5* $\delta_{0.3g}$	218	51.95	1.45	-0.06	2.80	Pass	-0.11	Pass
16	2:41 pm	9.0* $\delta_{0.3g}$	230	51.39	1.53	-0.14	2.98	Pass	-0.26	Pass
17	2:44 pm	9.5* $\delta_{0.3g}$	243	52.91	1.40	-0.13	2.65	Pass	-0.25	Pass
18	2:47 pm	10.0* $\delta_{0.3g}$	256	50.43	1.25	-0.17	2.48	Pass	-0.34	Pass
19	2:51 pm	10.5* $\delta_{0.3g}$	269	49.50	1.02	-0.01	2.06	Pass	-0.03	Pass
20	2:54 pm	10.5* $\delta_{0.3g}$	270	50.86	1.46	0.03	2.86	Pass	0.06	Pass

1. Maneuver execution should continue until a steering wheel angle magnitude factor of $6.5*\delta_{0.3g}$, or 270 degrees is utilized, whichever is greater provided the calculated magnitude of $6.5*\delta_{0.3g}$ is less than or equal to 300 degrees. If $6.5*\delta_{0.3g}$ is less than 270 degrees maneuver execution should continue by increasing the steering wheel angle magnitude by multiples of $0.5*\delta_{0.3g}$, without exceeding the 270 degree steering wheel angle.

3.0 TEST DATA....continued

DATA SHEET 8 (2 of 3) VEHICLE LATERAL STABILITY AND RESPONSIVENESS

Lateral Stability Test Series No. 2 – Clockwise Initial Steer Direction

Maneuver #	Clock Time (1.5 – 5 min between each test run)	Commanded Steering Wheel Angle ¹ (degrees)		Yaw Rates (degrees/sec)			YRR at 1.0 sec after COS [≤ 35%]		YRR at 1.75 sec after COS [≤ 20%]	
		Scalar	Angle	$\dot{\psi}_{Peak}$	$\dot{\psi}_{1.0sec}$	$\dot{\psi}_{1.75sec}$	%	Pass/Fail	%	Pass/Fail
1	2:58 pm	1.5* $\delta_{0.3g}$	38	-12.29	0.04	-0.02	-0.35	Pass	0.13	Pass
2	3:01 pm	2.0* $\delta_{0.3g}$	51	-15.96	0.16	0.04	-0.98	Pass	-0.28	Pass
3	3:04 pm	2.5* $\delta_{0.3g}$	64	-20.56	0.13	0.06	-0.65	Pass	-0.31	Pass
4	3:07 pm	3.0* $\delta_{0.3g}$	77	-24.03	0.11	-0.02	-0.44	Pass	0.06	Pass
5	3:11 pm	3.5* $\delta_{0.3g}$	90	-25.83	-0.06	-0.06	0.22	Pass	0.23	Pass
6	3:14 pm	4.0* $\delta_{0.3g}$	102	-31.01	0.10	0.19	-0.33	Pass	-0.61	Pass
7	3:17 pm	4.5* $\delta_{0.3g}$	115	-36.74	-0.09	0.01	0.24	Pass	-0.04	Pass
8	3:20 pm	5.0* $\delta_{0.3g}$	128	-41.92	0.16	0.04	-0.39	Pass	-0.10	Pass
9	3:23 pm	5.5* $\delta_{0.3g}$	141	-46.77	0.24	0.02	-0.51	Pass	-0.05	Pass
10	3:27 pm	6.0* $\delta_{0.3g}$	154	-51.29	-1.33	0.10	2.59	Pass	-0.20	Pass
11	3:30 pm	6.5* $\delta_{0.3g}$	166	-53.30	-1.18	-0.02	2.22	Pass	0.03	Pass
12	3:33 pm	7.0* $\delta_{0.3g}$	179	-57.73	-1.55	0.07	2.69	Pass	-0.12	Pass
13	3:36 pm	7.5* $\delta_{0.3g}$	192	-54.17	-1.01	0.17	1.87	Pass	-0.31	Pass
14	3:39 pm	8.0* $\delta_{0.3g}$	205	-54.72	-1.28	0.08	2.35	Pass	0.15	Pass
15	3:43 pm	8.5* $\delta_{0.3g}$	218	-55.91	-0.62	-0.01	1.10	Pass	0.02	Pass
16	3:46 pm	9.0* $\delta_{0.3g}$	230	-55.67	-1.10	-0.11	1.98	Pass	0.19	Pass
17	3:49 pm	9.5* $\delta_{0.3g}$	243	-56.52	-1.01	-0.10	1.79	Pass	0.18	Pass
18	3:53 pm	10.0* $\delta_{0.3g}$	256	-58.00	-1.35	0.03	2.32	Pass	-0.05	Pass
19	3:56 pm	10.5* $\delta_{0.3g}$	269	-56.58	-1.38	0.10	2.44	Pass	-0.17	Pass
20	3:59 pm	10.5* $\delta_{0.3g}$	270	-56.46	-1.46	0.11	2.58	Pass	-0.19	Pass

1. Maneuver execution should continue until a steering wheel angle magnitude factor of $6.5*\delta_{0.3g, overall}$ or 270 degrees is utilized, whichever is greater provided the calculated $6.5*\delta_{0.3g, overall}$ is less than or equal to 300 degrees. If $6.5*\delta_{0.3g, overall}$ is less than 270 degrees maneuver execution should continue by increasing the steering wheel angle magnitude by multiples of $0.5*\delta_{0.3g, overall}$ without exceeding the 270 degree steering wheel angle.

During execution of the sine with dwell maneuvers were any of the following events observed?

Rim-to-pavement contact	_____ Yes	<u>X</u> No
Tire debanding	_____ Yes	<u>X</u> No
Loss of pavement contact of vehicle tires	_____ Yes	<u>X</u> No
Did the test driver experience any vehicle loss of control or spinout?	_____ Yes	<u>X</u> No

If "Yes" explain the event and consult with the COTR. _____

3.0 TEST DATA....continued

DATA SHEET 8 (3 of 3) VEHICLE LATERAL STABILITY AND RESPONSIVENESS

Responsiveness – Lateral Displacement

Maneuver #	Initial Steer Direction	Commanded Steering Wheel Angle ($5.0^* \delta_{0.3g}$, overall or greater)		Calculated Lateral Displacement ¹	
		Scalar	Angle (degrees)	Distance (m)	Pass/Fail
8	Counter Clockwise	$5.0^* \delta_{0.3g}$	128	3.44	Pass
9	Counter Clockwise	$5.5^* \delta_{0.3g}$	141	3.47	Pass
10	Counter Clockwise	$6.0^* \delta_{0.3g}$	154	3.55	Pass
11	Counter Clockwise	$6.5^* \delta_{0.3g}$	166	3.60	Pass
12	Counter Clockwise	$7.0^* \delta_{0.3g}$	179	3.57	Pass
13	Counter Clockwise	$7.5^* \delta_{0.3g}$	192	3.57	Pass
14	Counter Clockwise	$8.0^* \delta_{0.3g}$	205	3.73	Pass
15	Counter Clockwise	$8.5^* \delta_{0.3g}$	218	3.65	Pass
16	Counter Clockwise	$9.0^* \delta_{0.3g}$	230	3.56	Pass
17	Counter Clockwise	$9.5^* \delta_{0.3g}$	243	3.64	Pass
18	Counter Clockwise	$10.0^* \delta_{0.3g}$	256	3.54	Pass
19	Counter Clockwise	$10.5^* \delta_{0.3g}$	269	3.52	Pass
20	Counter Clockwise	$10.5^* \delta_{0.3g}$	270	3.54	Pass
8	Clockwise	$5.0^* \delta_{0.3g}$	128	3.64	Pass
9	Clockwise	$5.5^* \delta_{0.3g}$	141	3.75	Pass
10	Clockwise	$6.0^* \delta_{0.3g}$	154	3.84	Pass
11	Clockwise	$6.5^* \delta_{0.3g}$	166	3.84	Pass
12	Clockwise	$7.0^* \delta_{0.3g}$	179	3.93	Pass
13	Clockwise	$7.5^* \delta_{0.3g}$	192	3.96	Pass
14	Clockwise	$8.0^* \delta_{0.3g}$	205	3.90	Pass
15	Clockwise	$8.5^* \delta_{0.3g}$	218	3.92	Pass
16	Clockwise	$9.0^* \delta_{0.3g}$	230	3.84	Pass
17	Clockwise	$9.5^* \delta_{0.3g}$	243	3.96	Pass
18	Clockwise	$10.0^* \delta_{0.3g}$	256	3.85	Pass
19	Clockwise	$10.5^* \delta_{0.3g}$	269	3.74	Pass
20	Clockwise	$10.5^* \delta_{0.3g}$	270	3.89	Pass

1. Lateral displacement should be ≥ 1.83 m (6 ft) for vehicles with a GVWR of 3,500 kg (7,716 lb) or less; and ≥ 1.52 m (5ft) for vehicles with a GVWR greater than 3,500 kg (7,716 lb).

DATA INDICATES COMPLIANCE:

PASS/FAIL PASS

REMARKS:

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 3-05-09
DATE: 3-17-09

3.0 TEST DATA....continued

DATA SHEET 9 MALFUNCTION WARNING TEST

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet/Cobalt SS/Passenger Car

VEHICLE NHTSA No.: C90103 TEST DATE: 3-06-09

METHOD OF MALFUNCTION SIMULATION:

Describe method of malfunction simulation: 1) Remove 3 ABS fuses (40A, 20A, and 10A)
from underhood bussed electrical center. 2) Disconnect left front wheel speed sensor
connector from harness.

MALFUNCTION TELLTALE ILLUMINATION:

Telltale illuminates and remains illuminated after ignition locking system is activated and if necessary the vehicle is driven at least 2 minutes.

 X Yes No

Time for telltale to illuminate after ignition system is activated and vehicle speed of
48± 8 km/h (30± 5mph) is reached.

 0 Seconds (must be within 2 minutes) X Pass Fail

ESC SYSTEM RESTORATION:

Telltale extinguishes after ignition locking system is activated and if necessary the vehicle is driven at least 2 minutes.

 X Yes No

Time for telltale to extinguish after ignition system is activated and vehicle speed of
48± 8 km/h (30± 5mph) is reached.

 10* Seconds (must be within 2 minutes) X Pass Fail

DATA INDICATES COMPLIANCE: PASS/FAIL PASS

REMARKS:

*For left front wheel speed sensor restoration, the vehicle required to be driven (<15 mph) In order to extinguish malfunction telltale.

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 3-06-09
DATE: 3-17-09

4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

Type	Output	Range	Resolution	Accuracy	Specifics	Serial Number	Calibration
Tire Pressure Gauge	Vehicle Tire Pressure	0-60psi	0.5 psi	±0.5% of applied pressure	Marsh Model: 89562 0-60psi	<u>N/A</u>	By: <u>TRC</u> Date: <u>2-6-09</u> Due: <u>5-7-09</u>
Platform Scales	Vehicle Total, Wheel, and Axle Load	0-2500 lb per each of four pads	0.5 lb	±1.0% of applied load	Mettler Toledo Model: JXGA1000	<u>5225831-5JC</u>	By: <u>Mettler</u> Date: <u>2-18-09</u> Due: <u>5-18-09</u>
Automated Steering Machine with Steering Angle Encoder	Handwheel Angle	±800 deg	0.25 deg	±0.25 deg	Heitz Automotive Testing Model: Sprint 3	<u>60303</u>	By: <u>TRC</u> Date: <u>11-06-08</u> Due: <u>11-06-09</u>
Multi-Axis Inertial Sensing System	Longitudinal, Lateral, and Vertical Acceleration Roll, Yaw, and Pitch Rate	Accelerometers: ±2 g Angular Rate Sensors: ±100 deg/s	Accelerometers: ≤10 ug Angular Rate Sensors: ≤0.004 deg/s	Accelerometers: ≤0.05% of full range Angular Rate Sensors: 0.05% of full range	BEI Technologies Model: MotionPAK MP-1	<u>0767</u>	By: <u>BEI Tech.</u> Date: <u>10-13-08</u> Due: <u>10-13-09</u>
Radar Speed Sensor and Dashboard Display	Vehicle Speed	0-125 mph	0.009 mph	±0.25% of full scale	A-DAT Corp. Radar Model: DRS-6 Display Model: RD-2	<u>1400437</u>	By: <u>A-DAT</u> Date: <u>11-5-08</u> Due: <u>11-5-09</u>
Ultrasonic Distance Measuring System	Left and Right Side Vehicle Height	5-24 inches	0.01 inches	±0.25% of maximum distance	Massa Products Corporation Model: M-5000/220	<u>104619 & 104613</u>	By: <u>Consumers Energy Laboratory Services</u> Date: <u>12-10-08</u> Due: <u>12-10-09</u>
Data Acquisition System [Amplify, Anti-Alias, and Digitize]	Record Time; Velocity; Distance; Lateral, Longitudinal, and Vertical Accelerations; Roll, Yaw, and Pitch Rates; Steering Wheel Angle.	Sufficient to meet or exceed individual sensors	200 Hz	Sufficient to meet or exceed individual sensors	Dewetron Sidehand DAS Model: DA-121-16 Digitizer Model: Dewe-Orion-1616-100 Amplifier/AntiAliasing: MDAQ-FILT-10-S	<u>12060</u> <u>1105</u>	By: <u>Dewetron</u> Date: <u>4-24-08</u> Due: <u>4-24-09</u>
Load Cell	Vehicle Brake Pedal Force	0-300 lb	1 lb	±0.05% of full scale	DATRON Model: DTM-LPA	<u>4970-1103</u>	By: <u>TRC</u> Date: <u>per test</u> Due: <u>per test</u>
Coordinate Measurement Machine	Inertial Sensing System Location	0-10 feet	0.001 inch	±0.003% of full scale	FARO International Model: Faro Arm N10	<u>U12-05-08-07108</u>	By: <u>FARO</u> Date: <u>9-26-08</u> Due: <u>9-26-09</u>
Outriggers	No output. Safety Item.	N/A	N/A	N/A	NHTSA Titanium Outriggers Model: Docket 2007-27662-11	N/A	N/A

5.0 PHOTOGRAPHS

- 5.1 ¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE
- 5.2 ¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE
- 5.3 VEHICLE CERTIFICATION LABEL
- 5.4 TIRE AND LOADING INFORMATION LABEL
- 5.5 WINDOW STICKER (MONRONEY LABEL)
- 5.6 ESC MALFUNCTION AND ESC OFF TELLTALE
- 5.7 ESC OFF CONTROL
- 5.8 ¾ FRONT VIEW - TEST VEHICLE INSTRUMENTED
- 5.9 ¾ REAR VIEW – TEST VEHICLE INSTRUMENTED
- 5.10 STEERING WHEEL CONTROLLER AND DATA ACQUISITION SYSTEM
- 5.11 STEERING CONTROLLER BATTERY BOX
- 5.12 VEHICLE SPEED SENSOR
- 5.13 BODY ROLL SENSOR (DRIVER SIDE)
- 5.14 BODY ROLL SENSOR (PASSENGER SIDE)



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2009 CHEVROLET
COBALT SS
FMVSS 126
VEHICLE No.: C90103
MARCH 2009

5.1 $\frac{3}{4}$ FRONT VIEW FROM LEFT SIDE OF VEHICLE



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2009 CHEVROLET
COBALT SS
FMVSS 126
VEHICLE No.: C90103
MARCH 2009

5.2 $\frac{3}{4}$ REAR VIEW FROM RIGHT SIDE OF VEHICLE



MFD BY GENERAL MOTORS CORP.

DATE
09/08

GVWR
1775 KG
3913 LB

GAWR FRT
923 KG
2034 LB

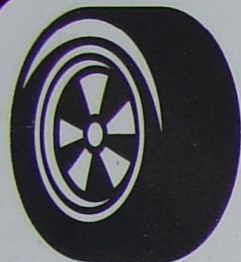
GAWR RR
852 KG
1879 LB

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR
VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS IN
EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

1G1AP18X197162661

TYPE: PASS CAR

2009 CHEVROLET
COBALT SS
FMVSS 126
VEHICLE No.: C90103
MARCH 2009



TIRE AND LOADING INFORMATION

SEATING CAPACITY

TOTAL 5

FRONT 2

REAR 3

The combined weight of occupants and cargo should never exceed 404 kg or 891 lbs.

TIRE	ORIGINAL SIZE		COLD TIRE PRESSURE
FRONT	225/40ZR18	Y	230 kPa, 33 PSI
REAR	225/40ZR18	Y	230 kPa, 33 PSI
SPARE	T115/70R16	M	420 kPa, 60 PSI

**SEE OWNER'S
MANUAL FOR
ADDITIONAL
INFORMATION**

1G1AP18X197162661

2009 CHEVROLET
COBALT SS
FMVSS 126
VEHICLE No.: C90103
MARCH 2009

5.4 TIRE AND LOADING INFORMATION LABEL



2009 COBALT SS TURBO COUPE

EXTERIOR: SPORT RED TINT COAT
INTERIOR: EBONY/EBONY

2.0L 4 CYL DOHC TURBO GAS
5-SPEED MANUAL TRANSMISSION

Visit us at www.chevy.com

STANDARD EQUIPMENT

ITEMS FEATURED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN

- 5 YEAR / 100,000 MILE POWERTRAIN LIMITED WARRANTY SEE DEALER FOR DETAILS

MECHANICAL

- ENGINE, 2.0L VVT, DIRECT INJECTION, TURBO
- TRANSMISSION, 5 SPD MANUAL WITH SHORT THROW SHIFTER
- SPEED SENSITIVE ELECTRIC POWER STEERING
- PERFORMANCE HANDLING SUSPENSION SYSTEM
- BREMBO 4 PISTON FRONT BRAKE CALIPERS

SAFETY & SECURITY

- ANTILOCK BRAKE SYSTEM
- 4 WHEEL DISC
- AIR BAGS, DUAL FRONTAL, PASSENGER SENSING SYSTEM

- HEAD CURTAIN SIDE AIRBAGS FRONT / REAR
- THEFT DETERRENT SYSTEM
- BATTERY RUNDOWN PROTECTION
- LATCH SYSTEM FOR CHILD SEATS
- EMERGENCY TRUNK RELEASE
- DAYTIME RUNNING LAMPS, AUTO HEADLAMPS
- STABILITRAK-STABILITY CONTROL
- TRACTION CONTROL SYSTEM
- 1 YR ONSTAR SAFE & SOUND (ASK DLR ABOUT TURN-BY-TURN NAVIGATION UPGRADE)
- TIRE PRESSURE MONITOR

EXTERIOR

- WHEELS, 18" FORGED ALUMINUM
- PERFORMANCE TIRES
- POWER OUTSIDE MIRRORS
- SPORT FACIAS & ROCKER MLDGS
- REAR SPOILER
- FOG LAMPS
- WINDSHLD WIPERS, INTERMITTENT

- BLACK DIAMOND MESH GRILLE

INTERIOR

- AIR CONDITIONING, AIR FILTRATION SYSTEM
- AM/FM STEREO CD PLAYER W/ AUX INPUT
- XM SATELLITE RADIO - SERVICE FEE EXTRA 1ST 3 MONTHS INCL.
- BLUETOOTH FOR PHONE
- AUDIO SYSTEM-HIGH PERFORMANCE WITH 7 PIONEER SPEAKERS
- PERFORMANCE SEATS, FRONT BUCKET, CLOTH WITH COLOR KEYED INSERTS
- MANUAL LUMBAR, DRIVER SEAT
- SEAT, REAR CLOTH BENCH, SPLIT FOLDING
- TACH & DRIVER INFO CENTER
- PILLAR MOUNTED BOOST GAUGE
- LEATHER WRAP STEERING WHEEL WITH RADIO CONTROLS
- TILT STEERING WHEEL

- CRUISE CONTROL
- POWER DOOR LOCKS
- POWER WINDOWS
- REMOTE KEYLESS ENTRY
- REAR WINDOW DEFROSTER
- FLOOR MATS, FRONT/REAR
- REMOTE TRUNK RELEASE
- TIRE SEALANT & INFLATOR KIT IN PLACE OF SPARE TIRE
- CONVENIENCE NET, CARGO

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE \$22,775.00

OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)

POWER SUNROOF	750.00
SPORT RED TINT COAT	295.00
AERO WING SPOILER	150.00
RADIO, AM/FM W/ SINGLE CD, AUX INPUT & USB	100.00

SPARE TIRE AND WHEEL 75.00

TOTAL OPTIONS	\$1,370.00
TOTAL VEHICLE & OPTIONS	\$24,145.00
DESTINATION CHARGE	660.00

TOTAL VEHICLE PRICE* \$24,805.00

EPA Fuel Economy Estimates

CITY MPG

22

Expected range for most drivers
18 to 26 MPG

Estimated
Annual Fuel Cost
\$2,460

based on 15,000 miles
at \$4.10 per gallon

HIGHWAY MPG

30

Expected range for most drivers
24 to 36 MPG

Combined Fuel Economy

This Vehicle

25

12 32
All SUBCOMPACT CARS

Your actual
mileage will vary
depending on how you
drive and maintain
your vehicle.

AXS

See the FREE Fuel Economy Guide at dealers or www.fueleconomy.gov

GOVERNMENT SAFETY RATINGS

Frontal Crash Driver Passenger ★★★★★
★★★★★

Star ratings based on the risk of injury in a frontal impact.
Frontal ratings should ONLY be compared to other vehicles of similar size and weight.

Side Crash Front seat ★★★★★
Rear seat ★★★★★

Star ratings based on the risk of injury in a side impact.

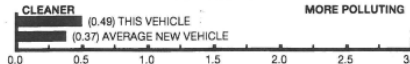
Rollover ★★★★★

Star ratings based on the risk of rollover in a single vehicle crash.

Star rating range from 1 to 5 stars (★★★★★), with 5 being the highest.
Source: National Highway Traffic Safety Administration (NHTSA).

www.safercar.gov or 1-888-327-4236

SMOG INDEX



Note: The Smog Index (SI) indicates the relative level of smog-forming pollutants emitted by this vehicle. The lower the SI, the lower the vehicle's emissions.

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 71%
MAJOR SOURCES OF FOREIGN PARTS
CONTENT: MEXICO 16%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL
ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
LORDSTOWN, OH U.S.A.
COUNTRY OF ORIGIN:
ENGINE: UNITED STATES
TRANSMISSION: SWEDEN

This label has been applied pursuant to Federal law - Do not remove prior to delivery to the ultimate purchaser. *Includes Manufacturer's Recommended Pre-Delivery Service. Does not include dealer installed options and accessories not listed above, local taxes or license fees.

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GMLBL_PROD_0013 - 06/01/2008

ORDER NO MZSKW2 SALES CODE E
SALES MODEL CODE 1AP37
DEALER NO 09076
FINAL ASSEMBLY:
LORDSTOWN, OH U.S.A.
VIN 1G1AP18X197162661
DEALER TO WHOM DELIVERED
COUGHLIN AUTOMOTIVE, LLC
PO BOX 1480
PATASKALA, OH 43062-1480



UU

1GA0919357

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5.5 WINDOW STICKER - MONRONEY LABEL



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5.7 ESC OFF CONTROL



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5.8 $\frac{3}{4}$ FRONT VIEW - TEST VEHICLE INSTRUMENTED



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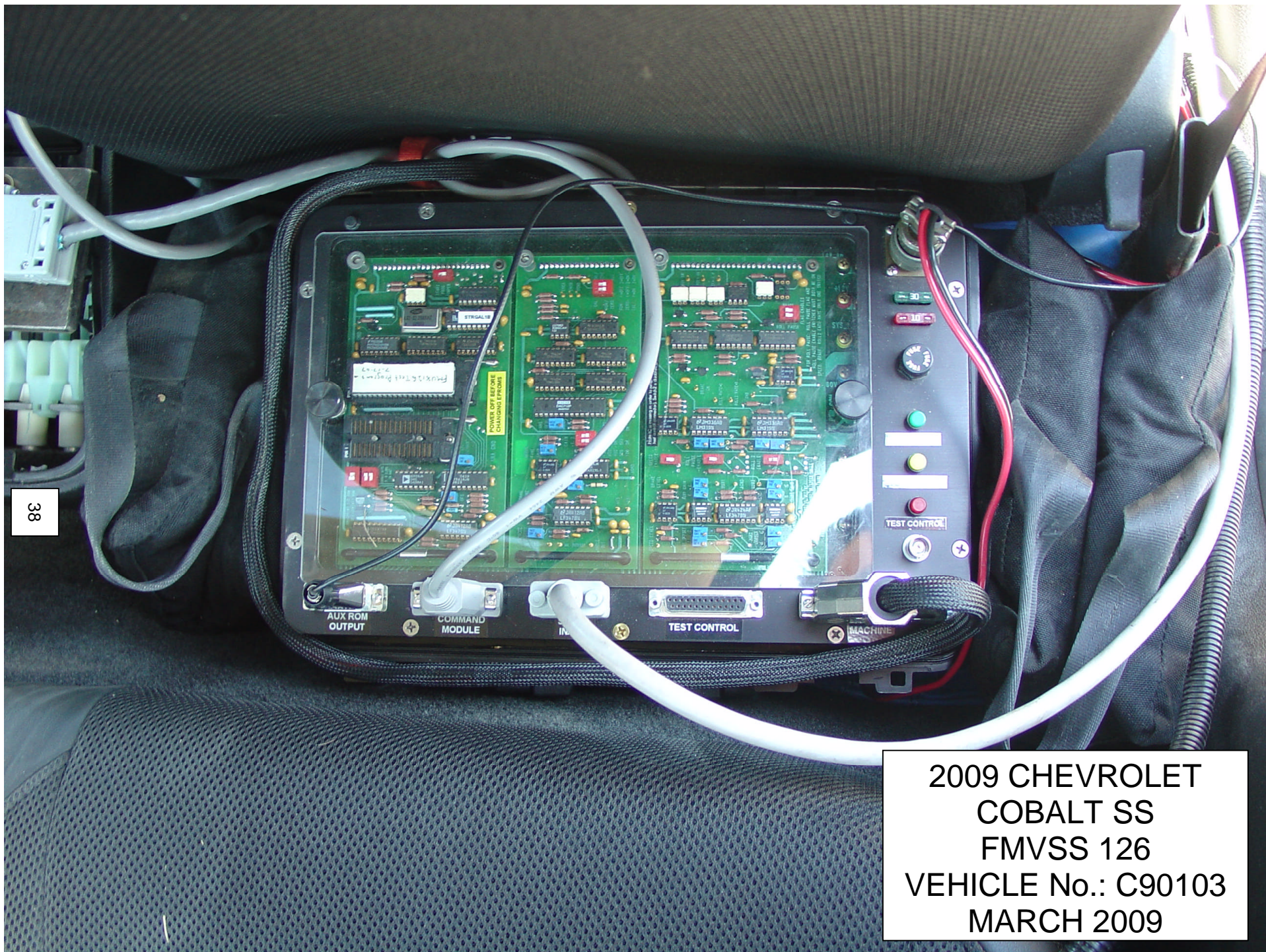
5.9 $\frac{3}{4}$ REAR VIEW - TEST VEHICLE INSTRUMENTED



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MARCH 2009

5.10 STEERING WHEEL CONTROLLER AND DATA ACQUISITION SYSTEM



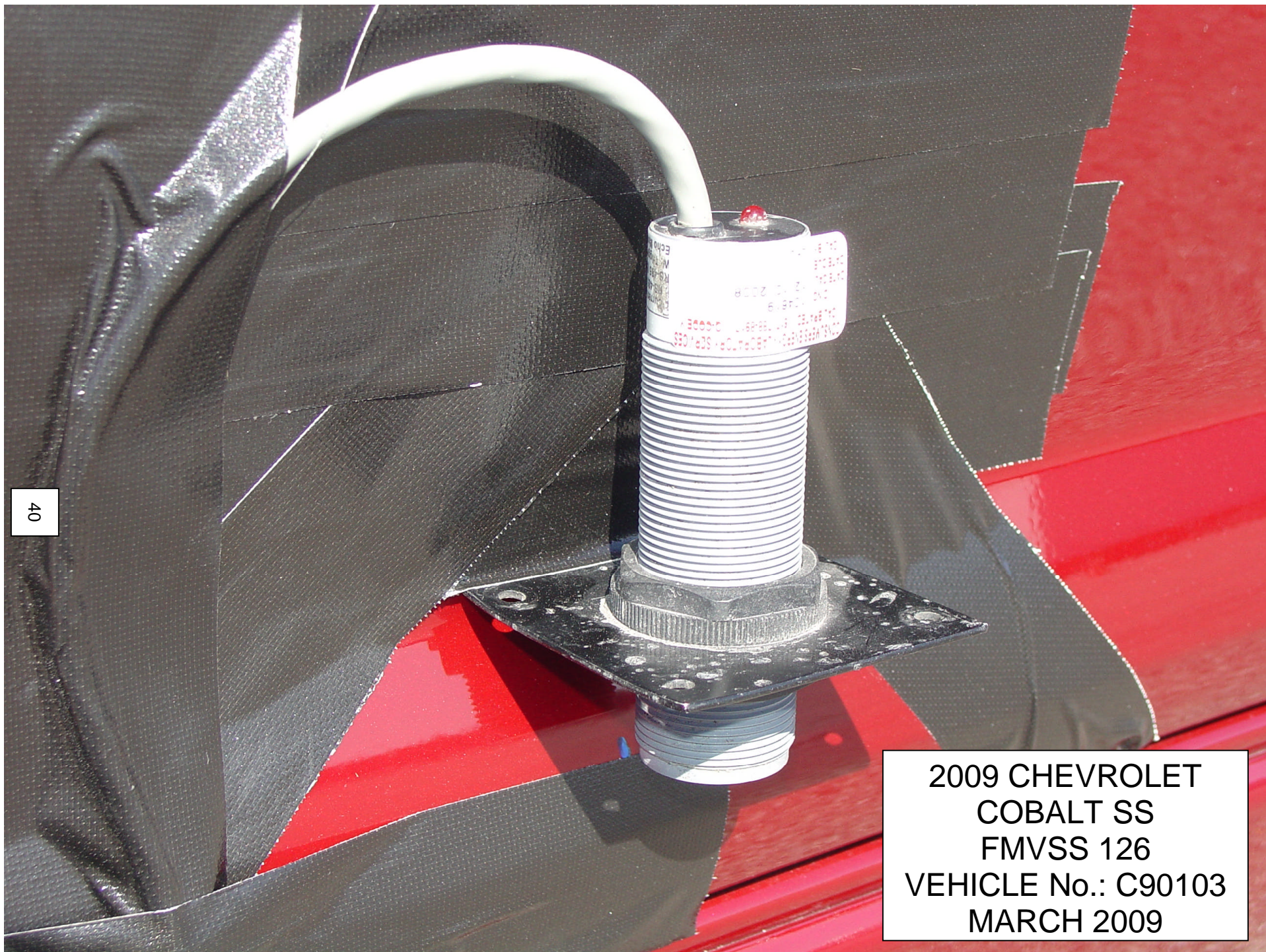
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5.11 STEERING CONTROLLER BATTERY BOX



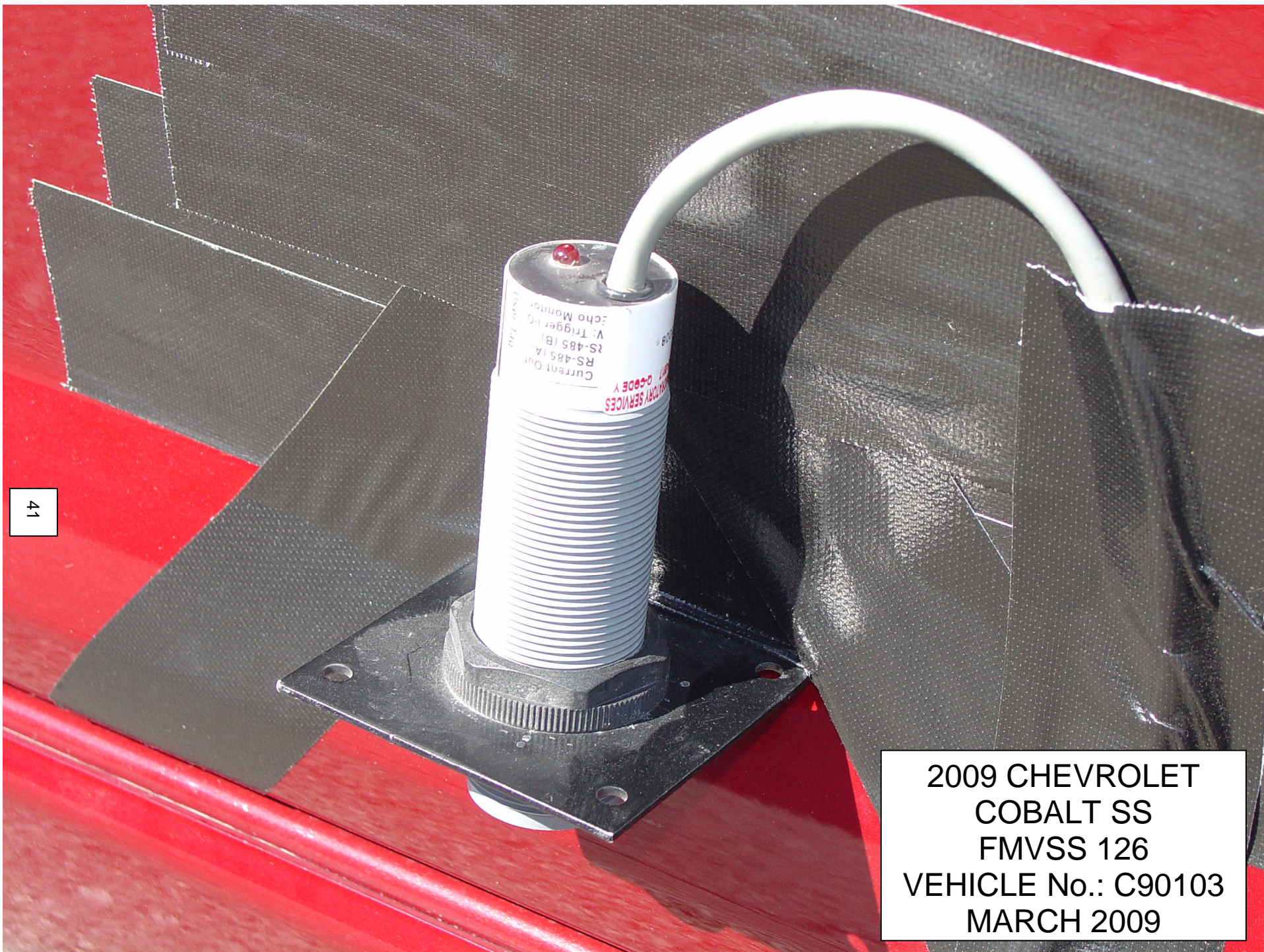
2009 CHEVROLET
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5.12 VEHICLE SPEED SENSOR



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5.13 BODY ROLL SENSOR (DRIVER SIDE)



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5.14 BODY ROLL SENSOR (PASSENGER SIDE)

6.0 DATA PLOTS

Figure 1. Steering Angle and Yaw Rate Time History, Counter-Clockwise Initial Steer Tests

Figure 2. Steering Angle, Lateral Acceleration, and Lateral Displacement Time History, Counter-Clockwise Initial Steer Tests

Figure 3. Steering Angle and Yaw Rate Time History, Clockwise Initial Steer Tests

Figure 4. Steering Angle, Lateral Acceleration, and Lateral Displacement Time History, Clockwise Initial Steer Tests

6.0 DATA PLOTS

Figure 1. Steering Angle and Yaw Rate Time History, Counter-Clockwise Initial Steer Tests

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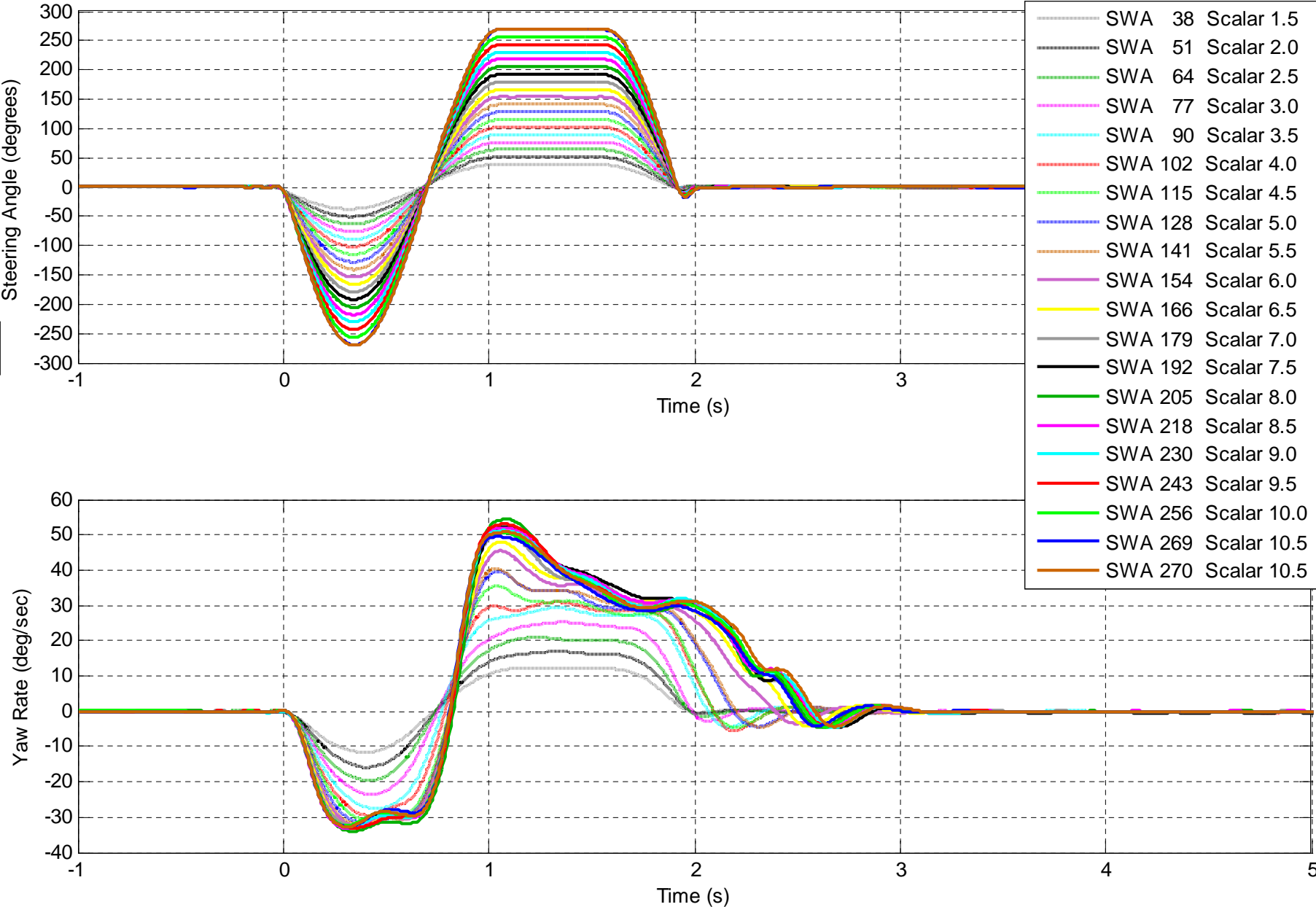


Figure 2. Steering Angle, Lateral Acceleration, and Lateral Displacement Time History, Counter-Clockwise Initial Steer Tests

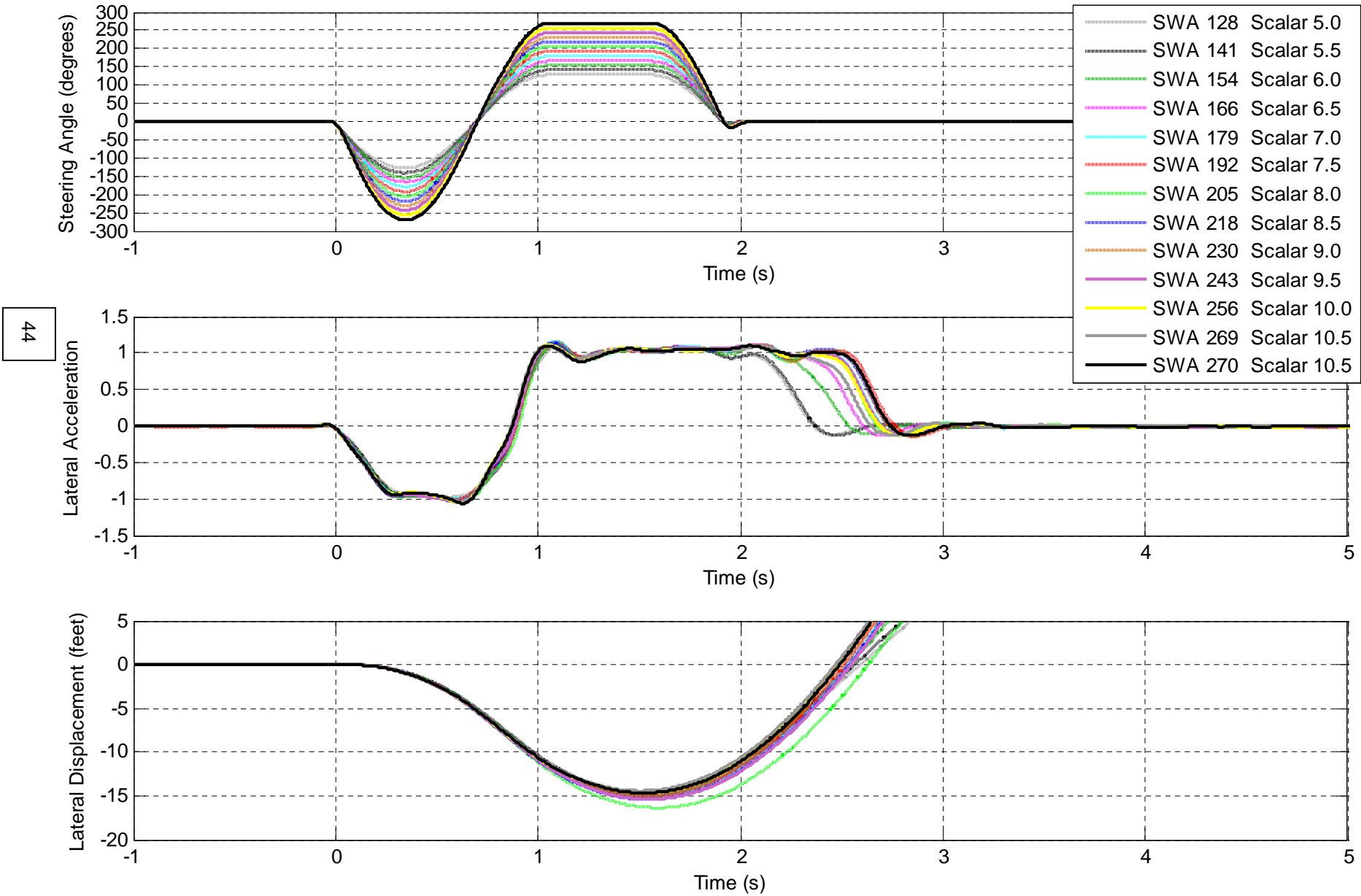


Figure 3. Steering Angle and Yaw Rate Time History, Clockwise Initial Steer Tests

45

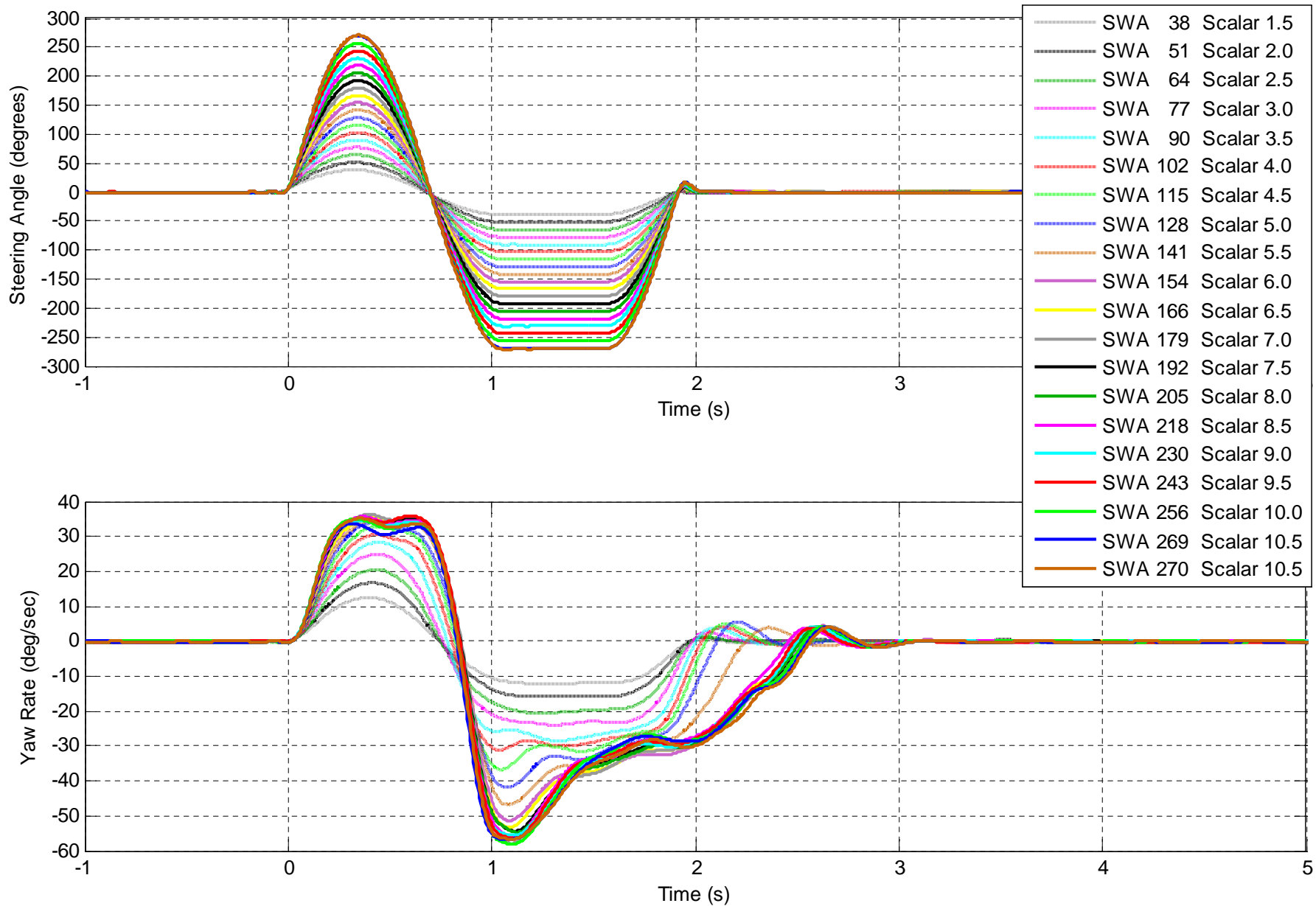
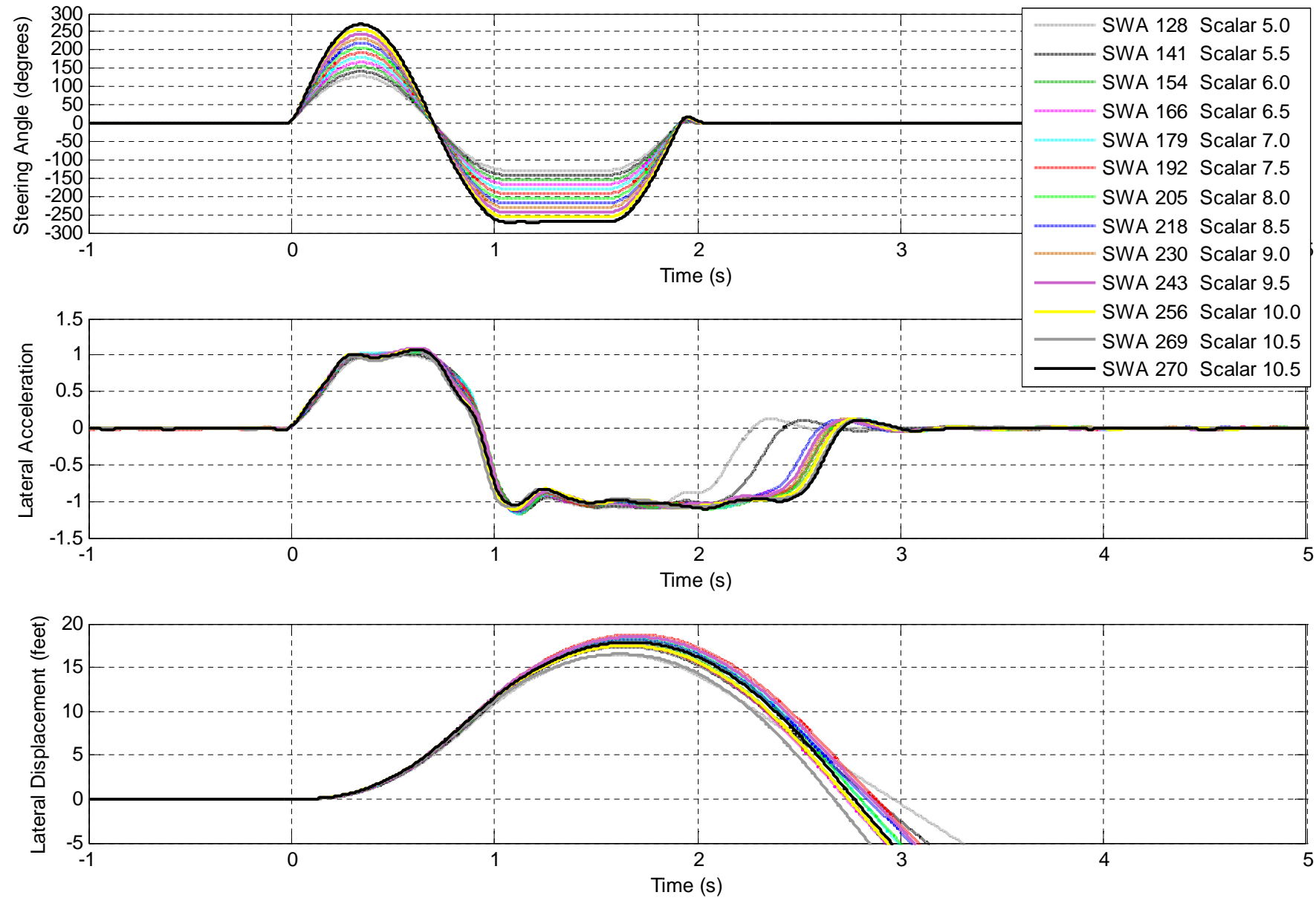


Figure 4. Steering Angle, Lateral Acceleration, and Lateral Displacement Time History, Clockwise Initial Steer Tests

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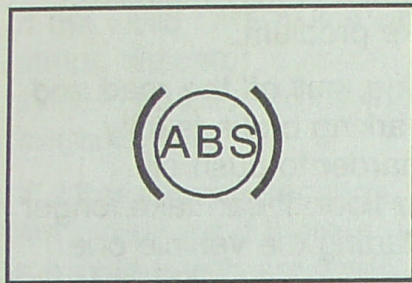


7.0 OTHER DOCUMENTATION

- 7.1 OWNER'S MANUAL PAGES
- 7.2 VEHICLE ARRIVAL CONDITION REPORT
- 7.3 VEHICLE COMPLETION CONDITION REPORT
- 7.4 SINE WITH DWELL TEST RESULTS
- 7.5 SLOWLY INCREASING STEER TEST RESULTS
- 7.6 INERTIAL SENSING SYSTEM LOCATION COORDINATES

7.1 OWNER'S MANUAL PAGES

Antilock Brake System (ABS) Warning Light



For vehicles with the Antilock Brake System (ABS), this light comes on briefly when the engine is started.

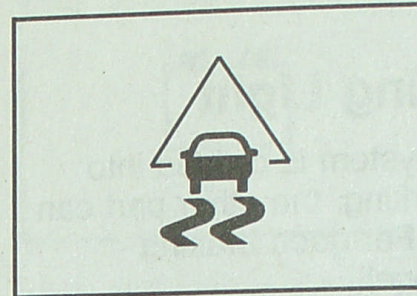
If it does not, have the vehicle serviced by your dealer/retailer. If the system is working normally the indicator light then goes off.

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If the ABS light stays on, turn the ignition off. If the light comes on while driving, stop as soon as it is safely possible and turn the ignition off. Then start the engine again to reset the system. If the ABS light stays on, or comes on again while driving, the vehicle needs service. If the regular brake system warning light is not on, the vehicle still has brakes, but not antilock brakes. If the regular brake system warning light is also on, the vehicle does not have antilock brakes and there is a problem with the regular brakes. See *Brake System Warning Light* on page 3-29.

For vehicles with a Driver Information Center (DIC), see *DIC Warnings and Messages* on page 3-46 for all brake related DIC messages.

Enhanced Traction System (ETS) Indicator/Warning Light



For vehicles with the Enhanced Traction System (ETS), this light serves as an indicator and warning light.

This light comes on briefly while the engine is started. If it does not, have the vehicle serviced by your dealer/retailer. If the system is working normally the indicator light then goes off.

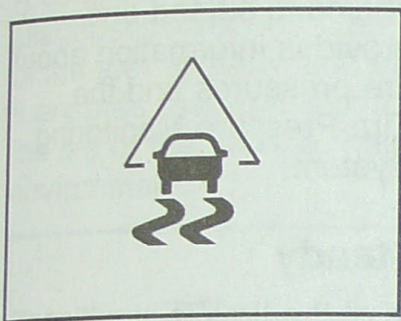
If the indicator/warning light is on and not flashing, the ETS system could have been disabled. Check all related Driver Information Center (DIC) messages to determine whether the system has been turned off or if the system is not working properly and the vehicle requires service. If the ETS has been disabled, wheel spin is not limited.

If the indicator/warning light is on and flashing, the ETS is actively working. The LOW TRACTION DIC message also appears when the system is actively limiting wheel spin.

See *Enhanced Traction System* and *DIC Warnings and Messages* for more information.

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Electronic Stability Control (ESC)/Traction Control System (TCS) Indicator/Warning Light



For vehicles with the Electronic Stability Control (ESC) system or the Traction Control System (TCS), the indicator/warning light comes on briefly when the engine is started.

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If it does not, have the vehicle serviced by the dealer/retailer. If the system is working normally the indicator light goes off.

If this light is on while certain DIC messages display, this indicates that the ESC and TCS are not working or are disabled.

If this light is on and not flashing, the TCS and potentially the ESC system have been disabled. Check the DIC messaging to determine which feature(s) is no longer functioning and whether it is because of the driver turning off the feature(s), or because the system is not working properly and the vehicle requires service.

If the TCS is disabled, wheel spin is not limited. If the ESC system is disabled, the system does not aid in maintaining directional control of the vehicle.

If the indicator/warning light is on and flashing, the TCS or the ESC system is actively working. Check the DIC messaging for details to determine which system is working. If the LOW TRACTION message appears, the system is limiting wheel spin. If the ESC ACTIVE message appears, the system is aiding in maintaining directional control of the vehicle.

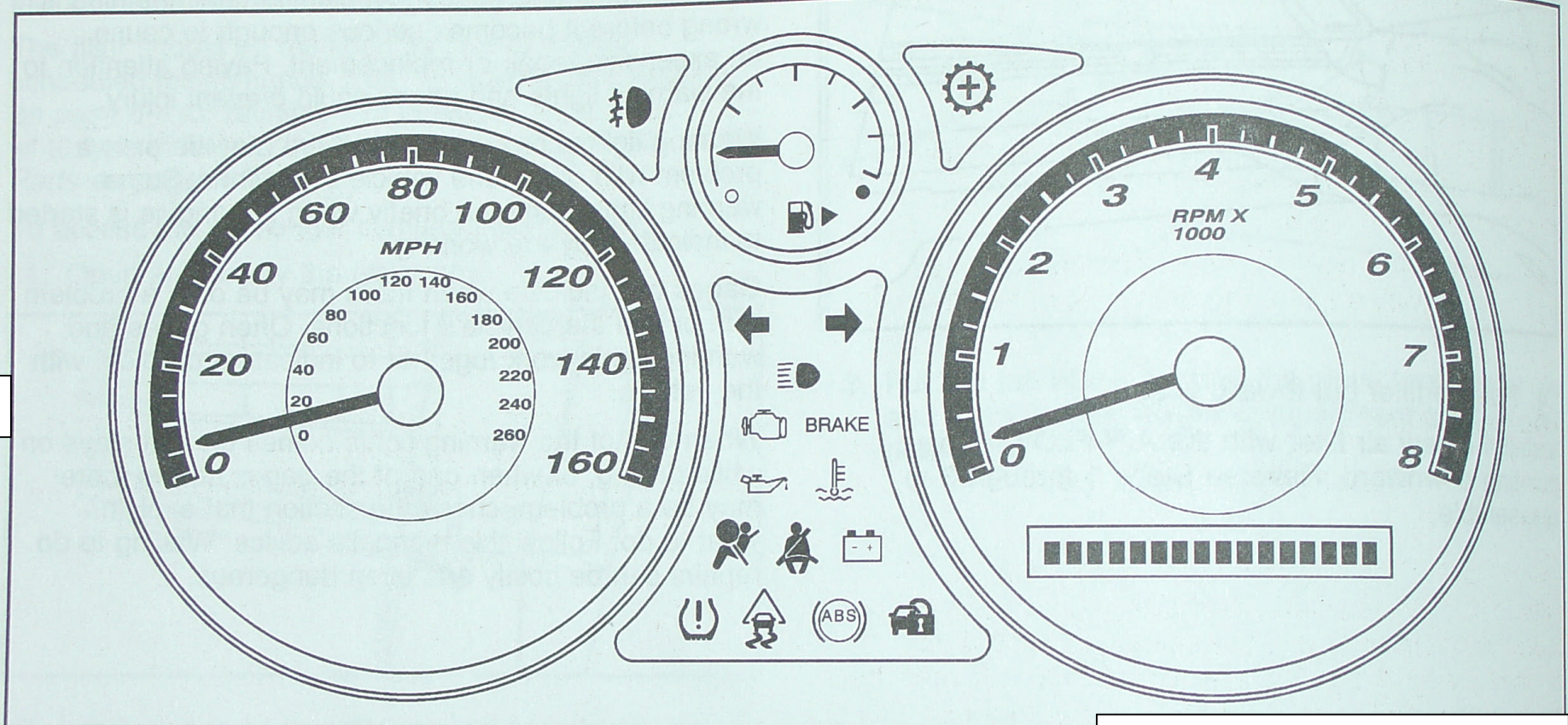
See *Electronic Stability Control (ESC)* on page 4-7 and *Traction Control System (TCS)* on page 4-10 for more information.

See *DIC Warnings and Messages* on page 3-46 for more information on the messages associated with this light.

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Instrument Panel Cluster

The instrument panel cluster is designed to show how the vehicle is running. It shows how fast the vehicle is going, about how much fuel is left in the tank, and many other things needed to drive safely and economically.



United States SS, Manual Transmission Cluster shown, Canada, Base and

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DOOR AJAR

This message displays if one or more of the vehicle's doors are open. Make sure that the door(s) are closed completely.

ENGINE DISABLED

This message displays if the starting of the engine is disabled. Have your vehicle serviced by your dealer/retailer immediately.

ENG (Engine) PWR (Power) REDUCED

This message displays to inform you that the vehicle has reduced engine power to avoid damaging the engine. Reduced engine power can affect the vehicle's ability to accelerate. If this message is on, but there is no reduction in performance, proceed to your destination. The performance may be reduced the next time the vehicle is driven. The vehicle may be driven at a reduced speed while this message is on, but acceleration and speed may be reduced. Anytime this message stays on, the vehicle should be taken to your dealer/retailer for service as soon as possible.

ESC (Electronic Stability Control) ACTIVE

If your vehicle has Electronic Stability Control (ESC), this message displays and the ESC/TCS light on the instrument panel cluster flashes when ESC is assisting you with directional control of the vehicle. You may feel or hear the system working and see this message displayed in the DIC. Slippery road conditions may exist when this message is displayed, so adjust your driving accordingly. This message may stay on for a few seconds after ESC stops assisting you with directional control of the vehicle. This is normal when the system is operating. See *Electronic Stability Control (ESC) on page 4-7* and *Electronic Stability Control (ESC)/Traction Control System (TCS) Indicator/Warning Light on page 3-31* for more information.

ESC (Electronic Stability Control) NOT READY

If your vehicle has Electronic Stability Control (ESC), this message may display briefly after starting the vehicle if the system's sensors are not yet calibrated. The system is not functional until the message stops displaying. Adjust your driving accordingly. When the message is no longer displayed, the system is functional. See *Electronic Stability Control (ESC) on page 4-7* for more information.

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ESC (Electronic Stability Control) OFF

If your vehicle has Electronic Stability Control (ESC), this message displays and the ESC/TCS light on the instrument panel cluster comes on solid when ESC is turned off. Adjust your driving accordingly. See *Electronic Stability Control (ESC) on page 4-7* and *Electronic Stability Control (ESC)/Traction Control System (TCS) Indicator/Warning Light on page 3-31* for more information.

ICE POSSIBLE

This message displays when the outside air temperature is cold enough to create icy road conditions. Adjust your driving accordingly.

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KEY FOB BATT (Battery) LOW

This message displays if the Remote Keyless Entry (RKE) transmitter battery is low. Replace the battery in the transmitter. See "Battery Replacement" under *Remote Keyless Entry (RKE) System Operation on page 2-4*.

LAUNCH CONTROL

If your vehicle has this feature, this message displays after the COMPETITIVE MODE message when the vehicle is stopped. Launch control is a form of traction control to control wheel spin while launching

the vehicle during closed track events and competitive driving venues. The system will exit to COMPETITIVE MODE after the vehicle is launched. See "COMPETITIVE MODE" earlier in this section. See "Launch Control" under *Electronic Stability Control (ESC) on page 4-7* for more information.

LEARN COMPLETE

On vehicles without the Remote Keyless Entry (RKE) system, this message displays when the Tire Pressure Monitor System (TPMS) has completed the tire learning process. See *Tire Pressure Monitor System on page 5-62* for more information.

LOW COOLANT

If your vehicle has a 2.0L engine, this message displays when there is a low level of engine coolant. Have the cooling system serviced by your dealer/retailer as soon as possible. See *Engine Coolant on page 5-27* for more information.

LOW FUEL

This message displays when your vehicle is low on fuel. Refill the fuel tank as soon as possible. See *Fuel Gage on page 3-37*, *F on page 5-8* for

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LOW TRACTION

If your vehicle has the Enhanced Traction System (ETS) or Traction Control System (TCS), this message displays and the ETS light or the ESC/TCS light on the instrument panel cluster flashes when the system is actively limiting wheel spin. Slippery road conditions may exist if this message is displayed, so adjust your driving accordingly. This message stays on for a few seconds after the system stops limiting wheel spin. See *Enhanced Traction System (ETS) on page 4-13* or *Traction Control System (TCS) on page 4-10* and *Enhanced Traction System (ETS) Indicator/Warning Light on page 3-30* or *Electronic Stability Control (ESC)/Traction Control System (TCS) Indicator/Warning Light on page 3-31* for more information.

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PARKING BRAKE

This message displays if the parking brake is left engaged. See *Parking Brake on page 2-30* for more information.

POWER STEERING

This message displays if a problem has been detected with the electric power steering. Have your vehicle serviced as soon as possible.

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SERVICE AIR BAG

This message displays when there is a problem with the airbag system. Have your vehicle serviced by your dealer/retailer immediately.

SERVICE ESC (ELECTRONIC STABILITY CONTROL)

If your vehicle has Electronic Stability Control (ESC), this message displays and a chime sounds if there has been a problem detected with ESC. The ESC/TCS light also appears on the instrument panel cluster. This light stays on solid as long as the detected problem remains present. When this message displays, the system is not working. Adjust your driving accordingly. See *Electronic Stability Control (ESC) on page 4-7* and *Electronic Stability Control (ESC)/Traction Control System (TCS) Indicator/Warning Light on page 3-31* for more information.

If this message turns on while you are driving, pull off the road as soon as possible and stop carefully. Try resetting the system by turning the ignition off and then back on. If this message still stays on or turns back on again while you are driving, your vehicle needs service. Have the ESC inspected by your dealer/retailer as soon as possible.

SERVICE TRACTION

If your vehicle has the Enhanced Traction System (ETS) or Traction Control System (TCS), this message displays and a chime sounds when the system is not functioning properly. The ETS light or the ESC/TCS light also appears on the instrument panel cluster. This light stays on solid as long as the detected problem remains present. When this message displays, the system is not working. Adjust your driving accordingly. See *Enhanced Traction System (ETS) on page 4-13* or *Traction Control System (TCS) on page 4-10* and *Enhanced Traction System (ETS) Indicator/Warning Light on page 3-30* or *Electronic Stability Control (ESC)/Traction Control System (TCS) Indicator/Warning Light on page 3-31* for more information. Have the system serviced by your dealer/retailer as soon as possible.

SVC (Service) BRAKE SYSTEM

This message may display if you have a turbocharged vehicle with Electronic Stability Control (ESC) and if the hydraulic brake boost is not working or is working improperly. Have the brake system serviced by your dealer/retailer as soon as possible.

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SVC (Service) TIRE MONITOR

If your vehicle is equipped with a Tire Pressure Monitoring System (TPMS), this message displays if a part on the TPMS is not working properly. The tire pressure light also flashes and then remains on during the same ignition cycle. See *Tire Pressure Light on page 3-32*. Several conditions may cause this message to appear. See *Tire Pressure Monitor Operation on page 5-63* for more information. If the warning comes on and stays on, there may be a problem with the TPMS. See your dealer/retailer.

TIRE LEARN ON

If your vehicle is equipped with a Tire Pressure Monitoring System (TPMS) and does not have the Remote Keyless Entry (RKE) system, this message displays when the TPMS is re-learning the tire positions on your vehicle. The tire positions must be re-learned after rotating the tires or after replacing a tire or sensor. See *Tire Inspection and Rotation on page 5-68*, *Tire Pressure Monitor System on page 5-62*, and *Inflation - Tire Pressure on page 5-60* for more information.

TRACTION OFF

If your vehicle has the Enhanced Traction System (ETS) or Traction Control System (TCS), this message displays and the ETS light or the ESC/TCS light on the instrument panel cluster comes on solid when the system is turned off. Adjust your driving accordingly. See *Enhanced Traction System (ETS) on page 4-13* or *Traction Control System (TCS) on page 4-10* and *Enhanced Traction System (ETS) Indicator/Warning Light on page 3-30* or *Electronic Stability Control (ESC)/Traction Control System (TCS) Indicator/Warning Light on page 3-31* for more information.

TRUNK AJAR

This message displays when the trunk is not closed completely. Make sure that the trunk is closed completely. See *Trunk on page 2-12*.

DIC Vehicle Personalization

Your vehicle has personalization capabilities that allow you to program certain features to a preferred setting. All of the features listed may not be available on your vehicle. Only the features available will be displayed on the DIC.

The default settings for the features were set when your vehicle left the factory, but may have been changed from their default state since that time.

To change feature settings, use the following procedure:

Entering Personalization Menu

1. Turn the ignition on while the vehicle is stopped. To avoid excessive drain on the battery, it is recommended that the headlamps are turned off.
2. Press and hold the information and reset buttons at the same time for one second, then release to enter the personalization menu.

If the vehicle speed is greater than 2 mph (3 km/h), only the UNITS menu will be accessible.

3. Press the information button to scroll through the available personalization menu modes.

Press the reset button to scroll through the available settings for each mode.

If you do not make a selection within ten seconds, the display will go back to the previous information displayed.

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Brake Assist

If this vehicle has ESC with ABS, it also has a Brake Assist feature designed to assist the driver in stopping or decreasing vehicle speed in emergency driving conditions. This feature uses the stability system hydraulic brake control module to supplement the power brake system under conditions where the driver has quickly and forcefully applied the brake pedal in an attempt to quickly stop or slow down the vehicle. The stability system hydraulic brake control module increases brake pressure at each corner of the vehicle until the ABS activates. Minor brake pedal pulsations or pedal movement during this time is normal and the driver should continue to apply the brake pedal as the driving situation dictates. The Brake Assist feature automatically disengage when the brake pedal is released or brake pedal pressure is quickly decreased.

Electronic Stability Control (ESC)

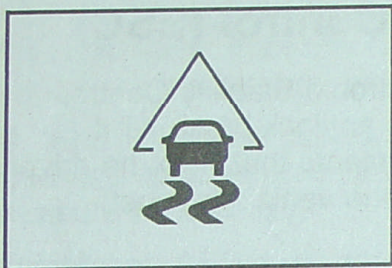
The vehicle may have an Electronic Stability Control (ESC) system which combines antilock brake, and traction and stability control systems that help the driver maintain directional control of the vehicle in most driving conditions.

When the vehicle is started and begins to move, the system performs several diagnostic checks to ensure there are no problems. The system may be heard or felt while it is working. This is normal and does not mean there is a problem with the vehicle. The system should initialize before the vehicle reaches 20 mph (32 km/h).

If the system fails to turn on or activate, the ESC/TCS light comes on, and the ESC OFF and/or SERVICE ESC message displays.

For more information, see *Driver Information Center (DIC)* on page 3-43 and *Electronic Stability Control (ESC)/Traction Control System (TCS) Indicator/Warning Light* on page 3-31.

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This light flashes on the instrument panel cluster when the ESC system is on and activated.

ESC activates when the computer senses a discrepancy between the intended path and the direction the vehicle is actually traveling. ESC selectively applies braking pressure at any one of the vehicle's brakes to help steer the vehicle in the intended direction.

When the system activates, an ESC ACTIVE message displays on the Driver Information Center. See *DIC Warnings and Messages on page 3-46*. This light also flashes on the instrument panel cluster when the ESC system is on and activated. Noise or vibration may be felt in the brake pedal. This is normal. Continue to steer the vehicle in the desired direction.

When the light is on solid and the message(s), SERVICE ESC, ESC OFF, or both display, the system will not assist the driver in maintaining directional control of the vehicle. Adjust your driving accordingly. See *DIC Warnings and Messages on page 3-46*.

The Electronic Stability Control (ESC) system is automatically enabled whenever the vehicle is started. To assist the driver with vehicle directional control, especially in slippery road conditions, always leave the system on. ESC can be turned off if needed.

If the vehicle is in cruise control when the system begins to assist the driver maintain directional control of the vehicle, the ESC/TCS light will flash and the cruise control will automatically disengage. The cruise control can be re-engaged when road conditions allow. See *Cruise Control on page 3-10*.



The ESC/TCS button is located on the instrument panel.

The traction control system can be turned off or back on by pressing the ESC/TCS button. To disable both traction control and ESC, press and hold the button from five to ten seconds.

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When the ESC system is turned off, the TRACTION OFF and ESC OFF messages appear, and the ESC/TCS light comes on to warn the driver that both traction control and ESC are disabled.

It is recommended that the system remain on for normal driving conditions, but it may be necessary to turn the system off if the vehicle is stuck in sand, mud, ice or snow, and you want to “rock” your vehicle to attempt to free it. It may also be necessary to turn off the system when driving in extreme off-road conditions where high wheel spin is required. See *If Your Vehicle is Stuck in Sand, Mud, Ice, or Snow* on page 4-25.

ESC may also turn off automatically if it determines that a problem exists with the system. The ESC OFF and SERVICE ESC messages and the ESC/TCS light comes on to warn the driver that ESC is disabled and requires service. If the problem does not clear after restarting the vehicle, see your dealer/retailer for service. See *DIC Warnings and Messages* on page 3-46 for more information.

Adding non-dealer/non-retailer accessories can affect the vehicle's performance. See *Accessories and Modifications* on page 5-3 for more information.

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Competitive Driving Mode (SS Models Only)

The driver can select this optional handling mode by pressing the ESC/TCS button on the console two times quickly. COMPETITIVE MODE will be displayed in the DIC. See *DIC Warnings and Messages* on page 3-46.

Competitive Driving Mode allows the driver to have full control of the front wheels while the ESC system helps maintain directional control of the vehicle by selective brake application. The ESC/TCS light will be on and the traction control system will not be operating. Adjust your driving accordingly. This electronic stability control mode is recommended only for use during closed track events and competitive driving venues.

When the ESC button is pressed again, or the vehicle is restarted, the ESC and TCS will be turned back on.

Notice: When traction control is turned off, or Competitive Driving Mode is active, it is possible to lose traction. If you attempt to shift with the front wheels spinning with a loss of traction, it is possible to cause damage to the transmission. Do not attempt to shift when the front wheels do not have traction. Damage caused by misuse of the vehicle is not covered. See your warranty book for additional information.

Launch Control (SS Models Only)

Launch Control is a form of traction control, to control tire spin while launching the vehicle during closed track events and competitive driving. The feature is activated when the vehicle is at rest while in Competitive Mode. At rest, if the accelerator pedal is pressed to the floor with the clutch engaged, the RPM is limited to a predetermined level. A smooth, quick release of the clutch while keeping the accelerator pedal on the floor will provide controlled wheel spin for consistent acceleration. If the vehicle is equipped with a manual transmission, complete shifts as described in *Manual Transmission Operation* on page 2-28.

60

LAUNCH CONTROL displays in the DIC after the COMPETITIVE MODE message, when the vehicle is stopped. The system will exit to COMPETITIVE MODE after the vehicle is launched. See "Competitive Driving Mode" earlier in this section. The normal Traction Control System (TCS) will not be operating while in the Competitive Driving mode and the TCS light on the instrument panel cluster comes on. Adjust your driving accordingly. See *DIC Warnings and Messages* on page 3-46 for more information.

Traction Control System (TCS)

The vehicle may have a Traction Control System (TCS) that limits wheel spin. This is especially useful in slippery road conditions. The system operates only if it senses that the front wheels are spinning too much or are beginning to lose traction. When this happens, the system works the front brakes and reduces engine power by closing the throttle and managing engine spark to limit wheel spin.



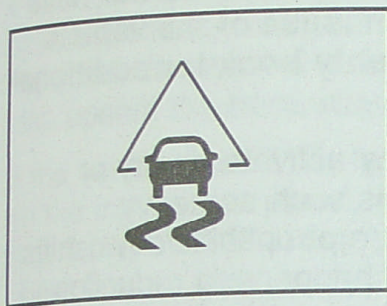
This light flashes while the traction control system is limiting wheel spin.

The system may be heard or felt while it is working. This is normal and does not mean there is a problem with the vehicle.

See *Electronic Stability Control (ESC)/Traction Control System (TCS) Indicator/Warning Light* on page 3-31 for more information.

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If the vehicle is in cruise control while TCS begins to limit wheel spin, the cruise control will automatically disengage. The cruise control can be re-engaged when road conditions allow. See *Turn Signal/Multifunction Lever* on page 3-7.



When this light is on and either the SERVICE TRACTION or TRACTION OFF message is displayed, the system will not limit wheel spin.

2 Adjust your driving accordingly. See *DIC Warnings and Messages* on page 3-46 for more information.

The Traction Control System comes on automatically whenever the vehicle is started. It is recommended to leave the system on for normal driving conditions, but it may be necessary to turn the system off if the vehicle is stuck in sand, mud, ice or snow, and you want to “rock” your vehicle to attempt to free it.

It may also be necessary to turn off the system when driving in off-road conditions where high wheel spin is required. See *If Your Vehicle is Stuck in Sand, Mud, Ice, or Snow* on page 4-25.



To turn the system off or on, press and release the ESC/TCS button located on the instrument panel.

The DIC displays the appropriate message as described previously when the button is pressed.

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Traction Control Operation

Traction control limits wheel spin by reducing engine power to the wheels (engine speed management) and by applying brakes to each individual wheel (brake-traction control) as necessary.

The traction control system is enabled automatically when the vehicle is started, and it will activate and flash the ESC/TCS light and display the LOW TRACTION message if it senses that either of the front wheels are spinning or beginning to lose traction while driving. For more information on the LOW TRACTION message, see *Driver Information Center (DIC)* on page 3-43.

Notice: If the wheel(s) of one axle are allowed to spin excessively while the ESC/TCS, ABS and Brake warning lights and the SERVICE ESC and/or SERVICE TRACTION messages are displayed, the differential could be damaged. The repairs would not be covered by the vehicle warranty. Reduce engine power and do not spin the wheel(s) excessively while these lights and this message are displayed.

Notice: When traction control is turned off, or Competitive Driving Mode is active, it is possible to lose traction. If you attempt to shift with the drive wheels spinning with a loss of traction, it is possible to cause damage to the transmission. Do not attempt to shift when the drive wheels do not have traction. Damage caused by misuse of the vehicle is not covered. See the warranty book for additional information.

The traction control system may activate on dry or rough roads or under conditions such as heavy acceleration while turning or abrupt upshifts/downshifts of the transmission. When this happens, a reduction in acceleration may be noticed or a noise or vibration may be heard. This is normal.

If the vehicle is in cruise control while the system activates, the ESC/TCS light flashes and the cruise control automatically disengages. The cruise control can be re-engaged when road conditions allow. See *Cruise Control* on page 3-10.

Adding non-dealer/non-retailer accessories can affect the vehicle's performance. See *Accessories and Modifications* on page 5-3 for more information.

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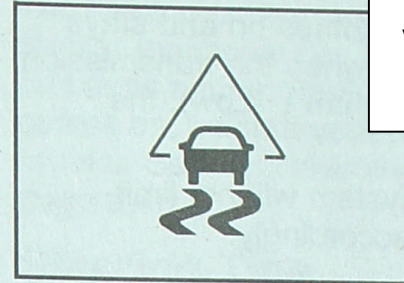
Enhanced Traction System (ETS)

The vehicle may have an Enhanced Traction System (ETS) that limits wheel spin. This is especially useful in slippery road conditions. The system operates only if it senses that one or both of the front wheels are spinning or beginning to lose traction. When this happens, the system reduces engine power and may also upshift the transmission to limit wheel spin.

If the vehicle has ETS, there is not an ESC/TCS button on the instrument panel. To turn the system off, shift to L (Low) or R (Reverse). There is more information about how to turn the system off later in this section.

3 The ETS indicator/warning light flashes and LOW TRACTION appears on the Driver Information Center (DIC) when the traction control system is actively limiting wheel spin. The system may be heard or felt while it is working, but this is normal. Slippery road conditions may exist if this message is displayed, so adjust your driving accordingly.

If the vehicle is in cruise control when the ETS begins to limit wheel spin, the cruise control will automatically disengage. The cruise control can be re-engaged when road conditions allow. See *Cruise Control* on page 3-10.



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The ETS indicator/warning light may come on for the following reasons:

- The indicator/warning light flashes while the traction control system is limiting wheel spin.
- If the system is turned off by moving the shift lever to L (Low), the indicator/warning light comes on and stays on. To turn the system back on, move the shift lever back to a position other than L (Low). The indicator/warning light should go off.
- The indicator/warning light will come on when the parking brake is set with the engine running, and it will stay on if the parking brake does not release fully. If the transmission shift lever is in any position other than L (Low) and the indicator/warning light stays on after the parking brake is fully released, there is a problem with the system.
- If the traction control system is affected by an engine related problem, the system will turn off and the indicator/warning light will come on.

If the ETS indicator/warning light comes on and stays on for an extended period of time when the transmission shift lever is in any position other than L (Low), the vehicle may need service.

When this light is on solid, the system will not limit wheel spin. Adjust your driving accordingly.

Check the DIC messaging to determine whether it is because of the driver turning off the system, or that the system may not be working properly and the vehicle requires service. When this light is turned on, either the SERVICE TRACTION or TRACTION OFF message will be displayed.

See *DIC Warnings and Messages on page 3-46* for more information on the messages associated with this light.

To limit wheel spin, especially in slippery road conditions, ETS should always be left on. But the system can be turned off if needed.

To turn the system off, shift to L (Low) or R (Reverse).

When the system is turned off, the ETS indicator/warning light will come on and stay on and the TRACTION OFF message will be displayed when the gear shift is in L (Low). The indicator/warning light and message will not come on when the gear shift is in R (Reverse). If the ETS is limiting wheel spin when the transmission is shifted to L (Low) or R (Reverse) to turn the system off, the indicator/warning light and TRACTION OFF will come on in L (Low). But the system will not turn off right away. It will wait until there is no longer a current need to limit wheel spin. See *DIC Warnings and Messages on page 3-46* for more information on the messages associated with this light.

The system can be turned back on at any time by shifting to D (Automatic Overdrive) or I (Intermediate). The ETS indicator/warning light should go off.

Adding non-dealer/non-retailer accessories can affect the vehicle's performance. See *Accessories and Modifications on page 5-3* for more information.

7.2 VEHICLE ARRIVAL CONDITION REPORT

CONTRACT NO. DTNH22-08-P-0097 DATE: 9/29/08

FROM: Ricart Automotive, Groveport, Ohio

TO: TRC

PURPOSE: (X) Initial () Received () Present
Receipt via Transfer vehicle condition

MODEL YEAR/MAKE/MODEL/BODY STYLE: 2009/Chevrolet/Cobalt/Pass Car

MANUFACTURE DATE: 09/08 NHTSA NO.: C90103

BODY COLOR: red VIN: 1G1AP18X197162661

ODOMETER READING: 91 miles GVWR: 1,775 KG

PURCHASE PRICE: \$ 22,820 DEALER'S NAME: Ricart Automotive

X ALL OPTIONS LISTED ON "WINDOW STICKER" ARE PRESENT ON THE TEST VEHICLE

X TIRES AND WHEEL RIMS ARE NEW AND THE SAME AS LISTED

X THERE ARE NO DENTS OR OTHER INTERIOR OR EXTERIOR FLAWS

X THE VEHICLE HAS BEEN PROPERLY PREPARED AND IS IN RUNNING CONDITION

X THE GLOVE BOX CONTAINS AN OWNER'S MANUAL, WARRANTY DOCUMENT, CONSUMER INFORMATION, AND EXTRA SET OF KEYS

X PROPER FUEL FILLER CAP IS SUPPLIED ON THE TEST VEHICLE

X PLACE VEHICLE IN STORAGE AREA

X INSPECT THE VEHICLE'S INTERIOR AND EXTERIOR, INCLUDING ALL WINDOWS, SEATS, DOORS, ETC., TO CONFIRM THAT EACH SYSTEM IS COMPLETE AND FUNCTIONAL PER THE MANUFACTURER'S SPECIFICATIONS. ANY DAMAGE, MISADJUSTMENT, OR OTHER UNUSUAL CONDITION THAT COULD INFLUENCE THE TEST PROGRAM OR TEST RESULTS SHALL BE RECORDED. REPORT ANY ABNORMAL CONDITION TO THE NHTSA COTR BEFORE BEGINNING ANY TEST

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 10-24-08
DATE: 3-17-09

7.3 VEHICLE COMPLETION CONDITION REPORT

CONTRACT NO. DTNH22-08-P-0097 DATE: 3/06/09

MODEL YEAR/MAKE/MODEL/BODY STYLE: 2009/Chevrolet /Cobalt / Pass Car

MANUFACTURE DATE: 09/08 NHTSA NO.: C90103

BODY COLOR: red VIN: 1G1AP18X197162661

ODOMETER READING: 183 miles GVWR: 1,775
KG

LIST OF FMVSS TESTS PERFORMED BY THIS LAB: 126

- ☒ THERE ARE NO DENTS OR OTHER INTERIOR OR EXTERIOR FLAWS
- ☒ THE VEHICLE HAS BEEN PROPERLY MAINTAINED AND IS IN RUNNING CONDITION
- ☒ THE GLOVE BOX CONTAINS AN OWNER'S MANUAL, WARRANTY DOCUMENT, CONSUMER INFORMATION, AND EXTRA SET OF KEYS
- ☒ PROPER FUEL FILLER CAP IS SUPPLIED ON THE TEST VEHICLE

REMARKS:

Equipment that is no longer on the test vehicle as noted on Vehicle Arrival Condition Report:
None.

Explanation for equipment removal:
N/A

Test Vehicle Condition:
Like new.

RECORDED BY: Alan Ida
APPROVED BY: Jeff Sankey

DATE: 3-06-09
DATE: 3-17-09

7.4 SINE WITH DWELL TEST RESULTS

2009 Chevrolet Cobalt SS

NHTSA No.: C90103

Date Created 5-Mar-09

File	SWA @ 5deg Ct	MES	Time@5deg	COS	Time@COS	MOS	Time@MOS	YRR1(%)	YR1 (deg/sec)	YRR1 Ct	YRR175(%)
21	619	50.31517993	3.085419016	999	4.986567161	755	3.767059022	0.304351765	0.037279392	1199	0.724347513
22	616	50.47300522	3.072578389	998	4.980050655	754	3.760769293	-0.374007107	-0.063631625	1198	-0.031080556
23	616	50.62186	3.070575018	998	4.98295768	754	3.76259916	-0.52614082	-0.110249229	1198	-0.509181469
24	615	50.531084	3.067338365	998	4.981125922	754	3.761895551	0.532257826	0.134773403	1198	0.057314241
25	614	50.42140943	3.061409248	997	4.976173311	753	3.757863438	0.960267175	0.282269445	1197	0.146881415
26	614	50.3883159	3.060230907	997	4.975944268	753	3.758071696	-0.0588281	-0.017584966	1197	-0.39833095
27	613	50.44614377	3.058243661	996	4.974455166	753	3.756847791	-0.1654747	-0.05866564	1196	-0.416960781
28	614	50.46054433	3.060700201	997	4.977252726	753	3.759977192	-0.540836886	-0.214460985	1197	-0.258369523
29	613	50.2825544	3.057274314	996	4.974396652	753	3.757258038	-0.755705869	-0.307050741	1196	-0.326385187
30	613	50.56621393	3.058885344	997	4.976942101	753	3.759449082	-0.42683803	-0.194162341	1197	-0.124685501
31	613	50.39410184	3.059080598	997	4.977519802	753	3.760013266	1.014736261	0.487330159	1197	-0.37540457
32	613	50.30372059	3.056044861	996	4.974369382	753	3.757096019	2.90938932	1.478082347	1196	-0.202354388
33	614	50.53069096	3.060322829	997	4.978308434	754	3.761050705	2.125963867	1.116274056	1197	-0.44784873
34	613	50.35570587	3.05668299	996	4.974451588	753	3.757815795	2.49429619	1.355329834	1196	-0.111977933
35	614	50.48539725	3.060033917	997	4.977374973	754	3.760859408	2.795256104	1.452056264	1197	-0.107448768
36	613	50.32083828	3.058343673	997	4.975498958	753	3.759185393	2.979320707	1.531181676	1197	-0.263514817
37	613	50.30093184	3.057691451	996	4.974941796	753	3.759203122	2.645255542	1.39964985	1196	-0.249540404
38	613	50.16972841	3.058317603	997	4.975399985	753	3.759889182	2.480012975	1.250733018	1197	-0.336556967
39	613	50.27206563	3.059321134	997	4.976678529	754	3.761270592	2.058347146	1.018899466	1197	-0.028997638
40	613	50.39728488	3.059563717	997	4.976855698	754	3.761359689	2.862680222	1.456070646	1197	0.055135515
41	618	50.51203569	3.081937444	999	4.986492449	754	3.763460226	-0.350601462	0.043105927	1199	0.134288579
42	616	50.41823664	3.071774388	998	4.981942778	753	3.758961196	-0.984988027	0.15720403	1198	-0.280795335
43	615	50.41120852	3.067275743	998	4.980906671	753	3.758893438	-0.652725425	0.134209484	1198	-0.311744239
44	615	50.48644066	3.06558648	998	4.980806416	754	3.760044624	-0.444977787	0.106938071	1198	0.063931197
45	615	50.45700669	3.065431557	998	4.981555269	754	3.761911712	0.22316878	-0.057654838	1198	0.234196641
46	614	50.33234786	3.063865722	998	4.981119893	754	3.761863118	-0.329229031	0.102080637	1198	-0.610623554
47	614	50.46274624	3.062159342	997	4.979464519	754	3.761293775	0.242724574	-0.089177854	1197	-0.036811187
48	613	50.30986245	3.057252527	996	4.974718679	753	3.757101354	-0.390196171	0.163569919	1196	-0.104396682
49	613	50.39389728	3.057216024	996	4.974982749	753	3.757517722	-0.510045921	0.238557246	1196	-0.05057073
50	613	50.27911751	3.056118226	996	4.974741298	753	3.756876582	2.58802501	-1.327514057	1196	-0.196995882
51	613	50.5224539	3.056990152	997	4.975797495	753	3.758277606	2.219917558	-1.183174559	1197	0.029827442
52	613	50.46267578	3.056204751	996	4.974870136	753	3.757630614	2.69335517	-1.554935105	1196	-0.121693166
53	613	50.47907041	3.057261642	997	4.975603234	753	3.758749749	1.868416776	-1.012164257	1197	-0.308222983
54	613	50.51248505	3.056523578	996	4.974611679	753	3.758071641	2.348092228	-1.284908817	1196	0.149949609
55	613	50.45920429	3.058190687	997	4.975863108	753	3.759892496	1.101629794	-0.61589046	1197	0.023541923
56	614	50.17761958	3.061085912	997	4.978820105	754	3.762722662	1.977733682	-1.101079091	1197	0.190888786
57	613	50.39738594	3.057488187	997	4.97535034	753	3.759750022	1.78829506	-1.010746158	1197	0.179683807
58	614	50.50788329	3.060541015	997	4.978188889	754	3.762595206	2.324676726	-1.348309312	1197	-0.045651711
59	613	50.23315276	3.05762947	997	4.975579884	754	3.760046759	2.443498408	-1.382467981	1197	-0.171225693
60	613	50.34776273	3.0574093	997	4.975549101	753	3.759861335	2.578903779	-1.456177912	1197	-0.18799209

7.4 SINE WITH DWELL TEST RESULTS

2009 Chevrolet Cobalt SS

NHTSA No.: C90103

Date Created

5-Mar-09

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File	YR175 (deg/sec)	YRR175 Ct	2nd Yaw Peak(deg/sec)	2nd Yaw Peak Ct	Lat Disp (ft)	Lat. Acc. 1.07s (g)	1st SWA Peak(deg)	1st SWA Peak Ct	2nd SWA Mean(deg)
21	0.088723766	1349	12.24878453	852	-4.007671388	0.44409727	37.73698185	683	37.93345554
22	-0.005287884	1348	17.01348009	883	-5.457266474	0.572337164	50.69175587	682	50.83236134
23	-0.106695513	1348	20.95431969	863	-6.795279953	0.692531974	63.57927659	682	63.80291225
24	0.014512582	1348	25.32107496	887	-8.014782242	0.814410199	76.56037953	682	76.765575
25	0.043175625	1347	29.39488635	882	-9.429839291	0.926939092	89.49624987	682	89.75492155
26	-0.119069565	1347	29.89211999	819	-10.13820423	0.994715046	101.8779156	682	102.0314215
27	-0.14782484	1346	35.45293629	821	-10.91312611	0.9725608	114.8343578	682	115.1420912
28	-0.102452669	1347	39.65354259	823	-11.29414508	0.996308	127.9165228	682	128.0631237
29	-0.132613517	1346	40.63098539	820	-11.40034716	1.028086373	140.8134857	682	140.9547201
30	-0.0567176	1347	45.48852906	825	-11.63765784	1.062531451	153.9526858	682	153.9901735
31	-0.180289181	1347	48.02530252	825	-11.79744832	1.075256488	165.8836884	682	165.9525106
32	-0.102803859	1346	50.80386929	826	-11.72563255	1.086626348	178.9060659	682	178.9476161
33	-0.235150712	1347	52.50672759	830	-11.72523822	1.070655506	191.9114178	683	191.8683629
34	-0.060845634	1346	54.3371649	830	-12.24753186	1.052511527	205.3206321	682	205.149665
35	-0.055816587	1347	51.94716368	828	-11.98712471	1.083371247	218.3090294	682	218.0239132
36	-0.135429884	1347	51.39365064	827	-11.69588489	1.047039656	230.4330933	682	229.8379776
37	-0.132036087	1346	52.91170655	828	-11.94203365	1.042312794	243.4464277	682	242.7232172
38	-0.169734157	1347	50.43251912	828	-11.61587752	1.045476312	256.6220909	682	255.6793782
39	-0.014354079	1347	49.50085645	822	-11.54828509	1.025600567	269.5352435	682	268.534905
40	0.02804407	1347	50.86389443	829	-11.6063069	1.037641459	270.5080285	682	269.5556261
41	-0.016510581	1349	-12.29485096	875	4.42522227	-0.428134895	38.49388809	682	38.42929881
42	0.044814919	1348	-15.95999403	870	5.666770035	-0.566180584	51.28731484	682	51.43617216
43	0.064098979	1348	-20.56139975	865	7.082690168	-0.67483285	64.31071582	682	64.30286305
44	-0.01536409	1348	-24.03222683	877	8.405960285	-0.791896152	77.26104607	682	77.28199815
45	-0.060503846	1348	-25.83463437	819	9.559902717	-0.887709659	90.17387448	683	90.24601089
46	0.189329723	1348	-31.00596459	822	10.67137234	-0.932631348	102.5143345	683	102.6056079
47	0.013524558	1347	-36.74034824	824	11.44458241	-0.964702893	115.6504798	683	115.6082302
48	0.043763004	1346	-41.91991902	828	11.94754759	-0.960861912	128.5882267	682	128.715292
49	0.0236528	1346	-46.77171913	829	12.31692991	-0.967846213	141.6268879	682	141.5333609
50	0.10104802	1346	-51.29448333	830	12.60028866	-1.028107223	154.6056486	682	154.6207261
51	-0.015897469	1347	-53.29813059	830	12.59416307	-1.057763804	166.7085612	682	166.4848123
52	0.070256228	1346	-57.73227099	832	12.9018646	-1.05236845	179.6235992	682	179.5369758
53	0.166971465	1347	-54.17229551	836	12.98767055	-1.021520247	192.6412191	682	192.2879412
54	-0.082054517	1346	-54.72139474	838	12.80531192	-1.010900803	205.9760558	682	205.7056949
55	-0.013161632	1347	-55.907208	836	12.85720418	-1.067401318	219.0991536	682	218.5078414
56	-0.106275002	1347	-55.67377959	835	12.5849325	-1.052910365	231.0865865	683	230.3516287
57	-0.101557467	1347	-56.5201001	836	12.97730023	-1.031350305	244.1470436	682	243.3767771
58	0.02647793	1347	-57.99986281	834	12.64062734	-1.046288079	257.1280678	682	256.3357013
59	0.096875053	1347	-56.57740462	829	12.26991843	-1.023427487	270.1646228	682	269.2787953
60	0.106149726	1347	-56.46499584	833	12.75332637	-0.982808572	271.0511468	682	270.1993637

7.5 SLOWLY INCREASING STEER TEST RESULTS
2009 Chevrolet Cobalt SS
NHTSA No.: C90103

Date Created 5-Mar-09

File	Vehicle	EventPt	DOS	MES [mph]	Mean SPD [mph]	AYcount_3	THETAENCF_3 [degree]	AYCG_CD2_3 [g]	r_squared	ZeroBegin	ZeroEnd
10	2009 Chevy Cobalt SS	694	1	50.14015884	50.12349701	1084	-25.70539364	-0.309347079	0.997261046	494	694
11	2009 Chevy Cobalt SS	581	1	50.16269553	50.26886361	1101	-26.52622499	-0.309552517	0.996047679	381	581
12	2009 Chevy Cobalt SS	693	1	50.0660307	50.11996127	1093	-26.28147497	-0.303200721	0.997793606	493	693
14	2009 Chevy Cobalt SS	701	0	49.68061381	50.04674694	1067	24.93164869	0.28677042	0.995781625	501	701
17	2009 Chevy Cobalt SS	698	0	50.02281649	49.92824892	1069	25.28036582	0.304257469	0.998381383	498	698
18	2009 Chevy Cobalt SS	699	0	50.17017727	50.43046058	1068	25.16323609	0.306797987	0.99809181	499	699
Averages							25.6	0.303321032			

Scalars	Steering Angles (deg)
1.5	38
2	51
2.5	64
3	77
3.5	90
4	102
4.5	115
5	128
5.5	141
6	154
6.5	166
7	179
7.5	192
8	205
8.5	218
9	230
9.5	243
10	256
10.5	269
10.5	270

7.6 INERTIAL SENSING SYSTEM LOCATION COORDINATES

2009 Chevrolet Cobalt SS

NHTSA No.: C90103

Device : U12-05-08-07108
device version : 2.24
device certification date : 09/26/08
today is : 3/4/2009
units : Millimeters

Label	ActualX	ActualY	ActualZ
C_DEVICEPOS001			
M_PLANE001	1455.436	-673.4729	-304.0115
M_LINE001	602.6503	143.9345	-99.9433
M_FRONT_AXLE_CENTER	0	0	0
C_COORDSYS001	0	0	0
M_TIRE_TREAD	277.8469	100.9583	-173.3844
M_INERTIA_PACK	1543.392	843.5128	257.2939
M_ROOF	1737.532	834.2634	1091.146
M_GROUND	1735.407	-227.0953	-304.0123
Track Width		1489.075	
Roof Height (relative to ground)			1395.158
Motion Pak - x-distance	1543.392		
Motion Pak - y-distance		-1.983	
Motion Pak - z-distance			516.8562
Motion Pak - x-distance (inches)	60.763		
Motion Pak - y-distance (inches)		-0.078	
Motion Pak - z-distance (inches)			20.349